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Rubber Age

COVERING THE MANUFACTURE OF RUBBER AND RUBBERLIKE PLASTICS PRODUCTS

SEPTEMBER, 1959 VOL. 85 NO. 6

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In This Issue

963 **Elastomers for Use in Radiation Fields. Part V. Effect of Gamma Radiation on Nitrile Elastomers**—By Robert Harrington
Concerning the effect of ionizing radiation on the physical properties of nitrile elastomers.

974 **Uses of Hypalon-Coated Nylon Fabrics**—By Langley W. Isom
Hypalon-coated fabrics are finding application in a wide variety of end-uses which subject them to unusually severe service conditions.

977 **The Use of Polyether Triols in Urethane Foams**—By R. K. Seizinger, S. Davis, J. M. McClellan and K. C. Frisch
A new series of materials provide a wide range of foam properties.

983 **How Crown Rubber Solved Its Steam Problem**
Installation of a package boiler system eliminated a shortage of steam which was hampering production.

984 **The Chemistry of Reinforcement. Part IV. A Model System Based On Carbon Black, Squalene, TMTD and Laurex**—By Merton L. Studebaker and Lester G. Nabors
A model system for a carbon black loaded TMTD cure is examined.

986 **Testing Tires for Supersonic Aircraft**
Testing of experimental tires is facilitated through the use of a new testing installation.

988 **Advantages of Factoring to the Rubber Manufacturer**
Outlining the methods by which a manufacturer may relieve himself of the chore of extending credit and collecting bills.

Special Reports

Capitol Cues	929	888	News Highlights
Markets	1048	1026	Overseas

Regular Departments

As Soule Sees It	939	1002	Names in the News
Book Reviews	1044	1038	New Equipment
Canadian News	1022	1028	New Goods
Chemical Prices	*	1024	Obituaries
Classified Ads	1063	959	On the Continent
Coming Events	910	896	Patent Review
Editorial	987	1020	West Coast News
Financial News	1006	1054	Statistics

*Appears every other month

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Highlights Sidelights *of the News . . .*

September, 1959

LATE NEWS: As this issue went to press, the Goodyear Tire & Rubber Co. and the United Rubber Workers Union announced they had reached an agreement calling for a 10¢ an hour pay increase for 24,000 Goodyear employees at 11 plants . . . The settlement must still be ratified by a majority of the rubber union's locals . . . The agreement is expected to set a pattern in wage negotiations between the union and other rubber companies.

News from Washington has it that close to 40,000 long tons of natural rubber will be released from the stockpile in the spring of 1960 . . . It has been emphasized that under stockpile regulations, six months' notice must be given before sales can begin (page 991).

Chemical Division of the Goodyear Tire & Rubber Co. has established two new sales departments – the Polyester Products Department and the Adhesives Department . . . The new units were formed to allow the division to coordinate sales activities in the polyester and adhesives fields (page 993).

FROM HERE AND THERE: W. R. Grace & Co. and the Hatco Chemical Co. have reached an agreement under which Grace will acquire the business and assets of Hatco (page 995) . . . Firestone has given $1,050,000 to the California Institute of Technology for the construction of the Firesone Aeronautical Research Laboratory (page 998) . . . 600 persons attended the Annual Golf Outing of the New York Rubber Group (page 1001) . . . Michael Storti has been elected president and general manager of the Rhee Elastic Thread Corp. (page 1003) . . . General Tire has broken ground for the construction of its new $9.5 million tire manufacturing plant at Mayfield, Ky. (page 1005) . . . Granite State Rubber Co. has announced plans for the expansion of its plant at Berlin, N.H. (page 1007) . . . Rubber and Tire Materials Corp. of Dallas, Texas, is expanding its production and warehouse facilities (page 1009) . . . John W. Simmons has been named president of the Wilson Rubber Co. (page 1010) . . . Firestone has appointed Earl B. Hathaway as vice-president in charge of all sales for the company (page 1014) . . . Dr. A. T. McPherson has been awarded the U.S. Department of Commerce Gold Medal for Exceptional Service (page 1016) . . . R. W. Maney, vice-president and general manager of the western region for the Goodyear Tire & Rubber Co., has celebrated his 30th anniversary with the company (page 1020) . . . Dacron may soon find use as a tire cord material (page 1051) . . . Milo J. Marsh has been appointed president of the Ohio Rubber Co. (page 995) . . . Godfrey L. Cabot, Inc., has moved to new home office headquarters at 125 High St., Boston 10, Mass. (page 998) . . . Aluminum Flake Co. liquidating (page 1000).

- *a highly reinforcing white pigment*
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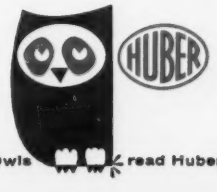

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This is another example of how fabrics made by Mount Vernon Mills, Inc. and the industries they serve, are serving America. Mount Vernon engineers and its laboratory facilities are available to help you in the development of any new fabric or in the application of those already available.

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Photo courtesy Lehigh Safety Shoe Company, Emmaus, Pa.

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If you're looking for an improvement in any rubber product, why not look into blends of CHEMIGUM and PLIOFLEX. Full details and technical service are yours by writing to:

Goodyear, Chemical Division, Dept. I-9419,
Akron 16, Ohio

GOODYEAR

CHEMICAL DIVISION

Chemigum, Plioflex—T. M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

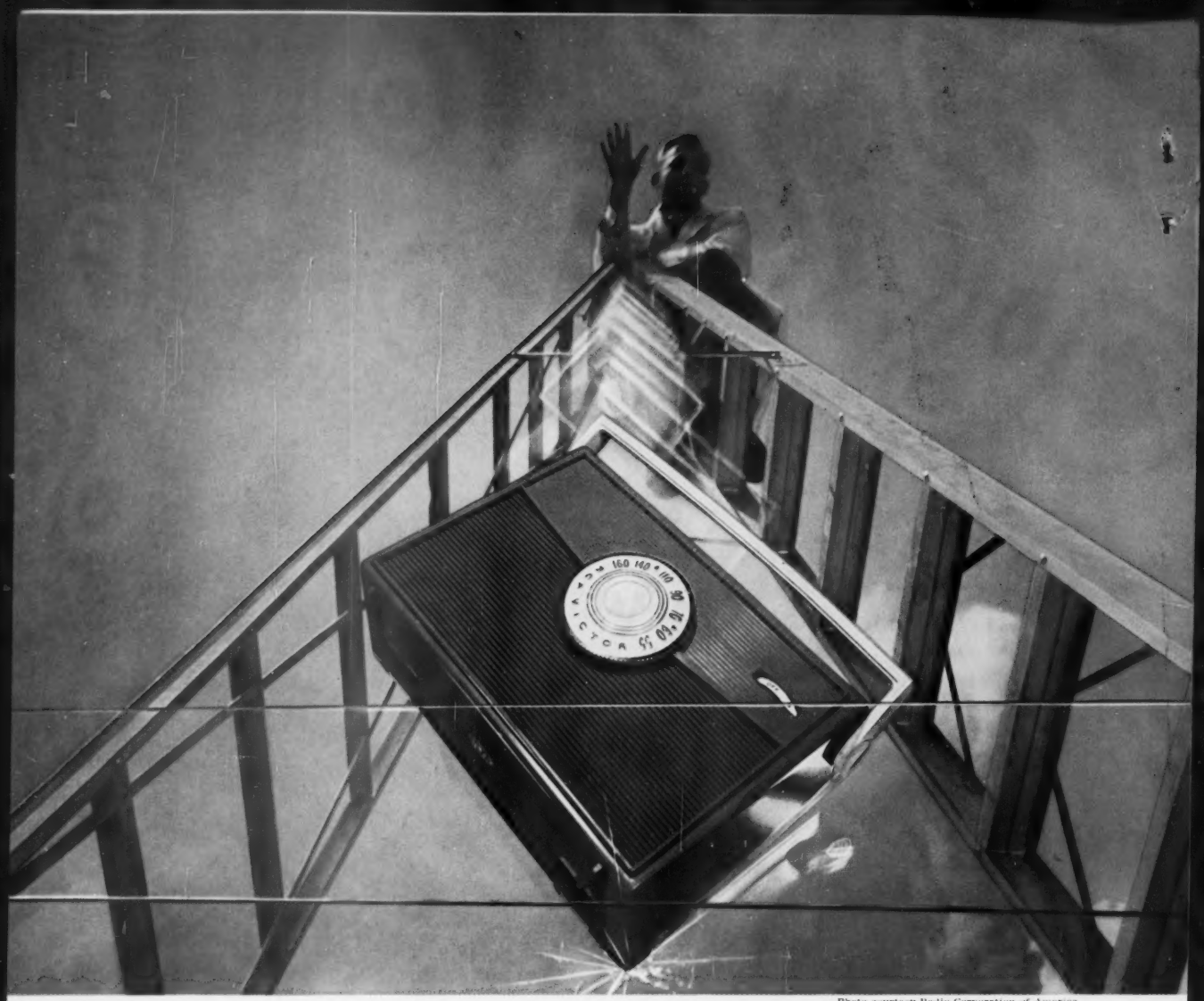

Photo courtesy Radio Corporation of America

Secret of a Smashing Success

Dropped 10 feet—this polystyrene radio case bounced, clattered, *but did not break*. It did not chip or crack—did not show a single mark of its high dive. Dramatic evidence, wouldn't you say, of the remarkable strength being built into modern plastics.

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Making more durable, more salable radio cases is but one of the many uses for the many types of PLIOFLEX. How can you use PLIOFLEX to advantage, either alone or in combination with other materials? Find out by writing to Goodyear, Chemical Division, Dept. I-9419, Akron 16, Ohio.

GOODYEAR

CHEMICAL DIVISION

Plioflex—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

NOW—1 rubber chemical does the work of 3

You can see the difference that new WING-STAY 100 makes in the two sidewalls above. What *is* WING-STAY 100? It's a mixed diaryl-p-phenylenediamine—the first truly effective combination of stabilizer, antioxidant and antiozonant.

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GOODYEAR

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Pliolex, Wing-Stay—T.M.'s The Goodyear Tire & Rubber Company, Akron, Ohio

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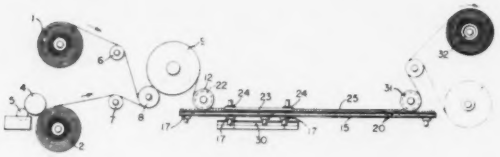
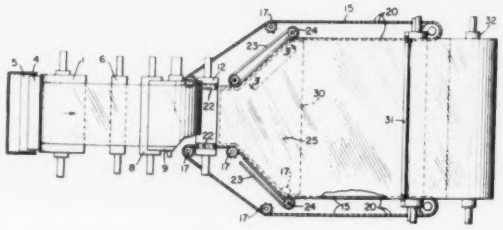
PATENT REVIEW

by Melvin Nord

Stretching Rubber Hydrochloride Film

U. S. Patent 2,866,231, issued December 30, 1958 to Paul J. Vaughan, assigned to Goodyear Tire & Rubber Co., relates to stretching rubber hydrochloride film which is crystalline at ordinary temperatures and becomes amorphous on heating. The film is stretched longitudinally and then laterally to at least double its unstretched area. The temperature of the two stretching operations is regulated in such a way that the resulting stretched film is non-blocking, i.e., it is free of tack and can immediately be wound for shipment.



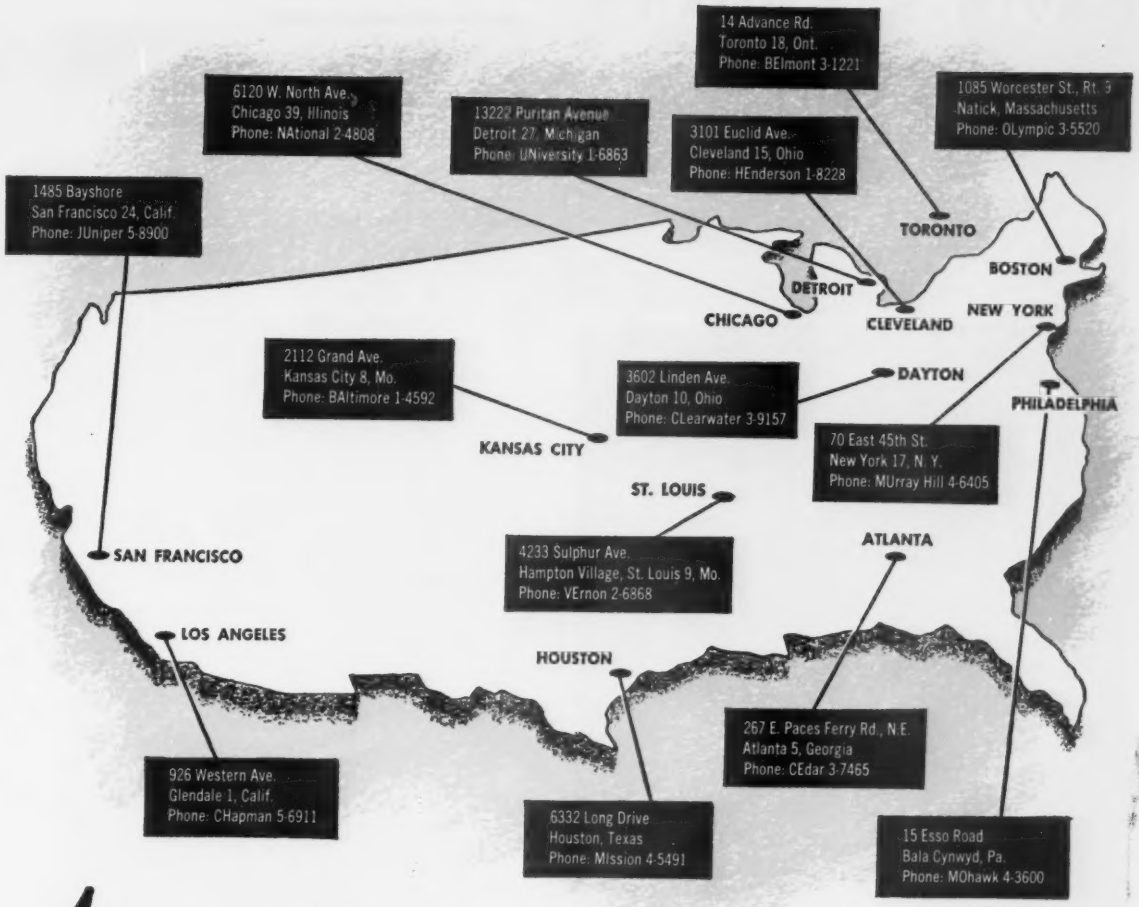


The schematic diagrams show two stock rolls (1 and 2) for the unstretched rubber hydrochloride film. In the production of laminated film the under surface of the top roll or the upper surface of the bottom roll may be printed. The roll (4) is a printing roll which is inked by an inking roll (5). The ink employed is a quick-drying ink and may be adhesive after removal of the solvent.

From the stock rolls the films pass over ironing rolls (6 and 7) and under the rubber draw roll (8). Then they pass over the heated drum (9). This drum heats the films to the desired temperature.

From the heated drum the film passes under the stretching roll (12). It is operated at a higher surface speed than the heated drum and may, for example, have a speed twice that of the heated drum. The roll (12) is a rubber roll or a rubber-covered roll to prevent slippage of the film on its surface, and also because a rubber surface is more quickly heated to the temperature of the heated film than a metal surface.

This longitudinally stretched film is then



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For more information, write for Bulletin SC-59, Address Dept. RA-959, The Sinclair-Collins Valve Company, 454 Morgan Ave., Akron 11, Ohio.

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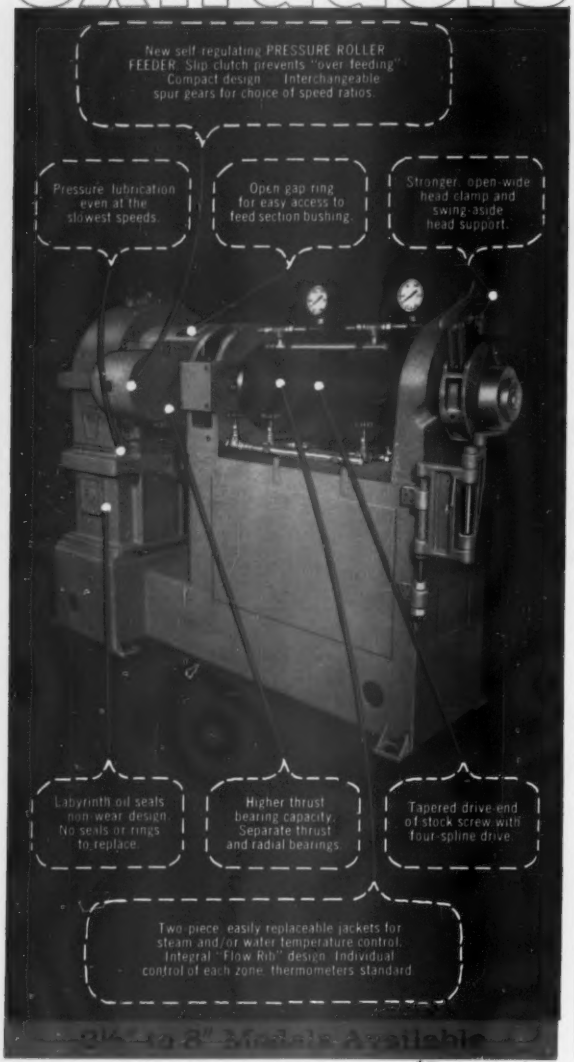
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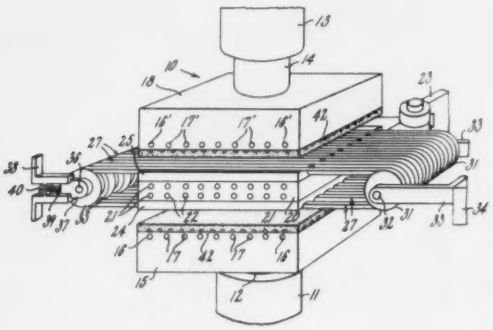
PATENT REVIEW

stretched laterally. The preferred equipment is a tentering device not unlike that employed in the treatment of cloth. The tentering chains (15) travel around the sprockets (17), and their rate of travel is the same as that of the surface of the roll (12). The tentering chains diverge and stretch the film laterally. When the film reaches the end of the tentering chain it passes around the stripping roll (31) and then to the wind-up roll (32).

Molding and Curing Belts

U. S. Patent 2,867,845, issued January 13, 1959 to Herman C. Sauer, assigned to United States Rubber Co., describes an apparatus for molding and curing belts such as V-belts.

As shown in the diagram below, the apparatus consists of a hydraulic press (10) which includes



a lower cylinder (11), a lower piston (12), an upper cylinder (13) and an upper piston (14). The cylinders are stationary while the pistons are vertically aligned and reciprocable in corresponding cylinders. A lower platen (15) is mounted on and reciprocable with the lower piston (12). This platen has a horizontal upper surface and is provided with a pair of outer passages (16) and a number of intermediate passages (17). These passages are adapted to transmit steam through the platen to heat the platen and associated parts during the belt molding and curing procedure. The outer passages (16) serve to supply a cooling fluid for chilling portions of the belts. An upper platen (18) is secured to and reciprocable with the upper piston (14). Platen 18 is provided with passages (16′ and 17′) corresponding to passages 16 and 17, respectively, of platen 15.

The press also includes a stationary platen (20) which is positioned between platens 15 and 18. Platen 20 is provided with outer passages (21) and intermediate passages (22), corresponding in location and function to passages 16 and 16′ and 17 and 17′, respectively.

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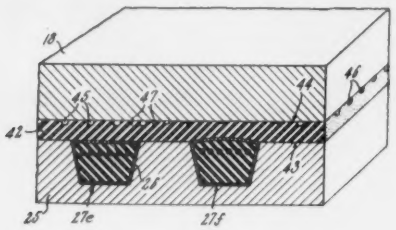
PATENT REVIEW

of platen 20 is a lower mold plate (24) and an upper mold plate (25). Each mold plate is formed with a number of cavities (26). As shown



in the schematic above, the mold cavities have the cross sectional shape of V-belts. A blanket member (44) is used to prevent the formation of lumps in the portions of the belts adjacent the outer ends of the mold cavities.

When blanket members (42) are placed under pressure by the platens during operation, the lands (47) are deformed independently of each other thereby permitting each member to "give" or be reduced to thickness while retaining its original length and width dimensions. Hence, there is no tendency for the belt materials to flow toward the open ends of the mold cavities as the members (42) are not elongated when in active use.

Siloxane Rubber Glass Cord Tire

U. S. Patent 2,827,099, issued March 18, 1958 to Delmar C. Youngs, and assigned to Dow Corning Corp., describes a truck tire consisting of siloxane rubber, reinforced with coated glass cords. It is characterized by its ability to withstand high temperatures.

In preparing the tires of this invention it is necessary to first coat the individual glass filaments of the cords with an organosiloxane. This can be done by applying to the filaments a fluid organosilicon composition or a solution or suspension of an organosilicon composition and thereafter passing the filaments through a curing zone and then spinning the coated fibers into cords of the desired size. The siloxane may be applied in any convenient manner such as by dipping or spraying. If desired, the spun cord may likewise be coated with an organosilicon composition and thereafter cured so that the entire assembly of filaments acquires an organosilicon coating. The cords are thereafter embedded in uncured or partially cured sheets of silicone rubber which are then laminated together with a tread and formed into a tire in accordance with the conventional method for preparing automotive tires.

Siloxanes which are useful for coating the

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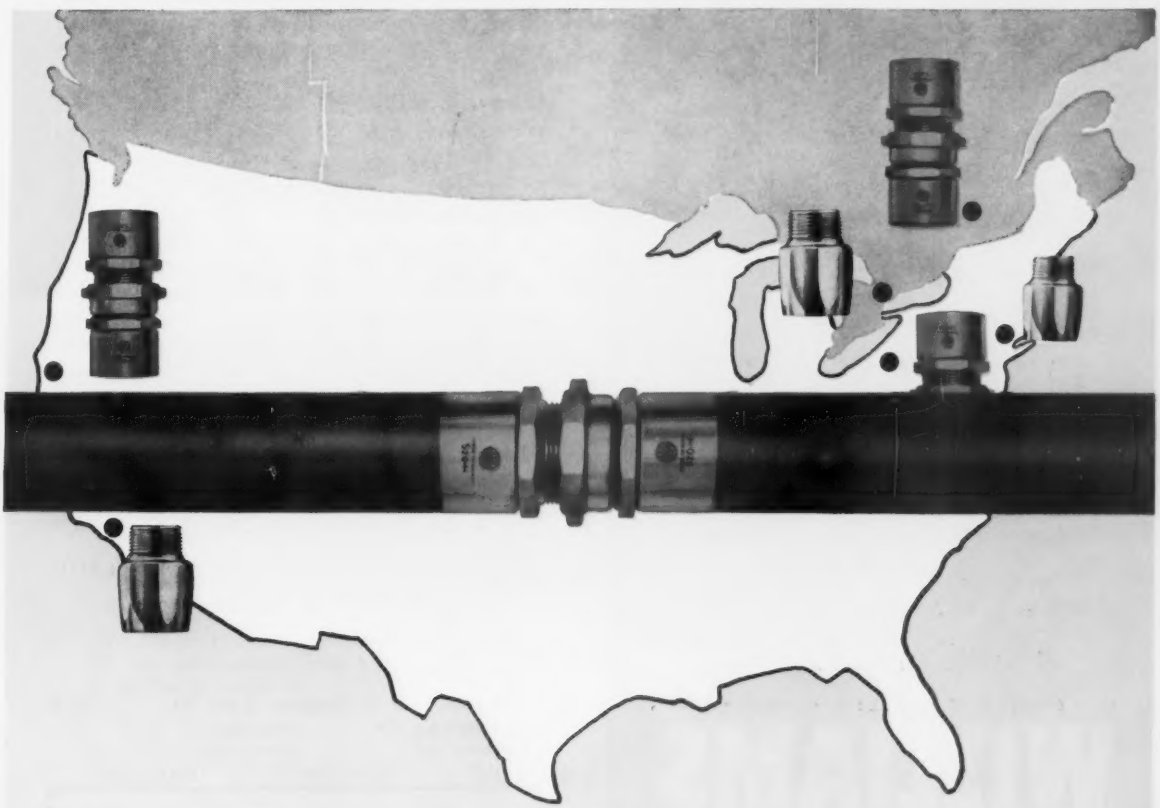

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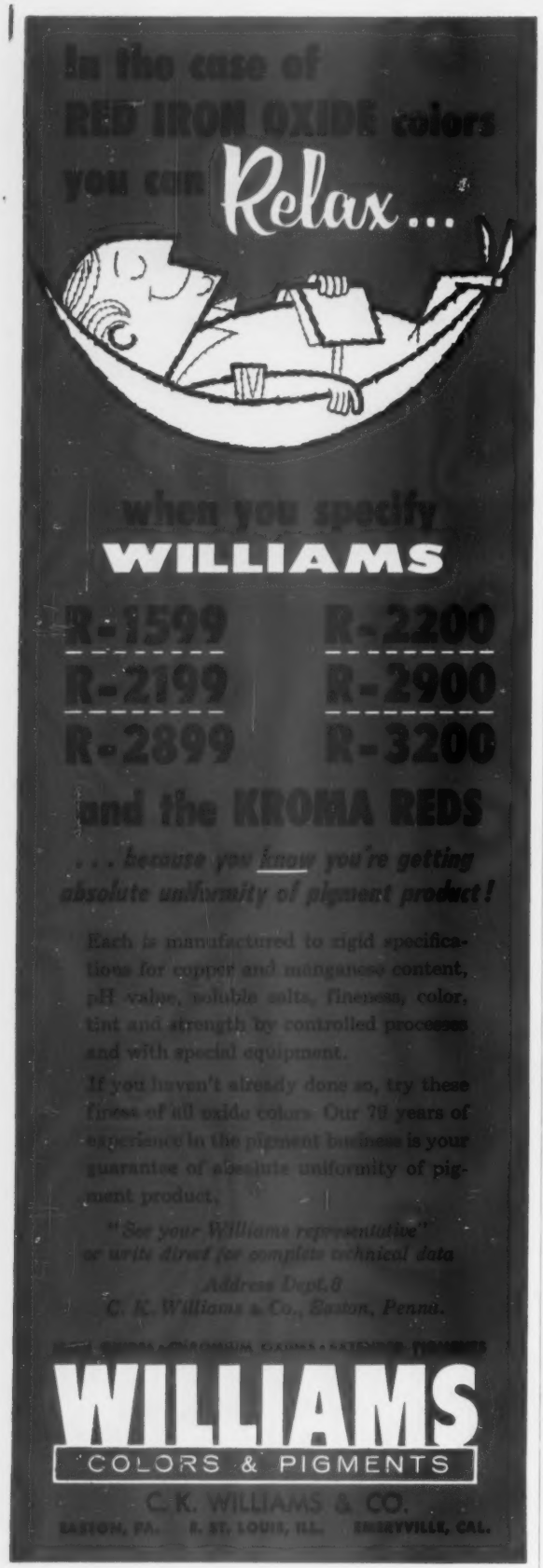
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PATENT REVIEW

individual glass filaments in accordance with this invention include any organopolysiloxane having an average of from 1.9 to 2 monovalent hydrocarbon radicals per silicon atom. These siloxanes serve both as a protective coating and as a bonding agent for the glass filaments. The siloxanes may or may not contain fillers such as silica, aerogels, fume silicas, titania, clay, carbon black and other finely divided inorganic materials. Preferably the siloxanes are cured on the glass filaments by action of an organic peroxide.

The cords employed in the tires of this invention are prepared by drawing glass into filaments of from .0002 to .0004 inch in diameter and then passing these filaments through the organosilicon coating composition. The filaments may then be gathered into strands of about 200 filaments each and the strands are passed through the heating zone to cure the siloxane coating. This procedure is preferred since the strands are easier to manipulate than the individual filaments. Furthermore when the filaments are gathered before curing, the strand is bound together as a unitary whole, thereby giving a stronger ultimate cord.

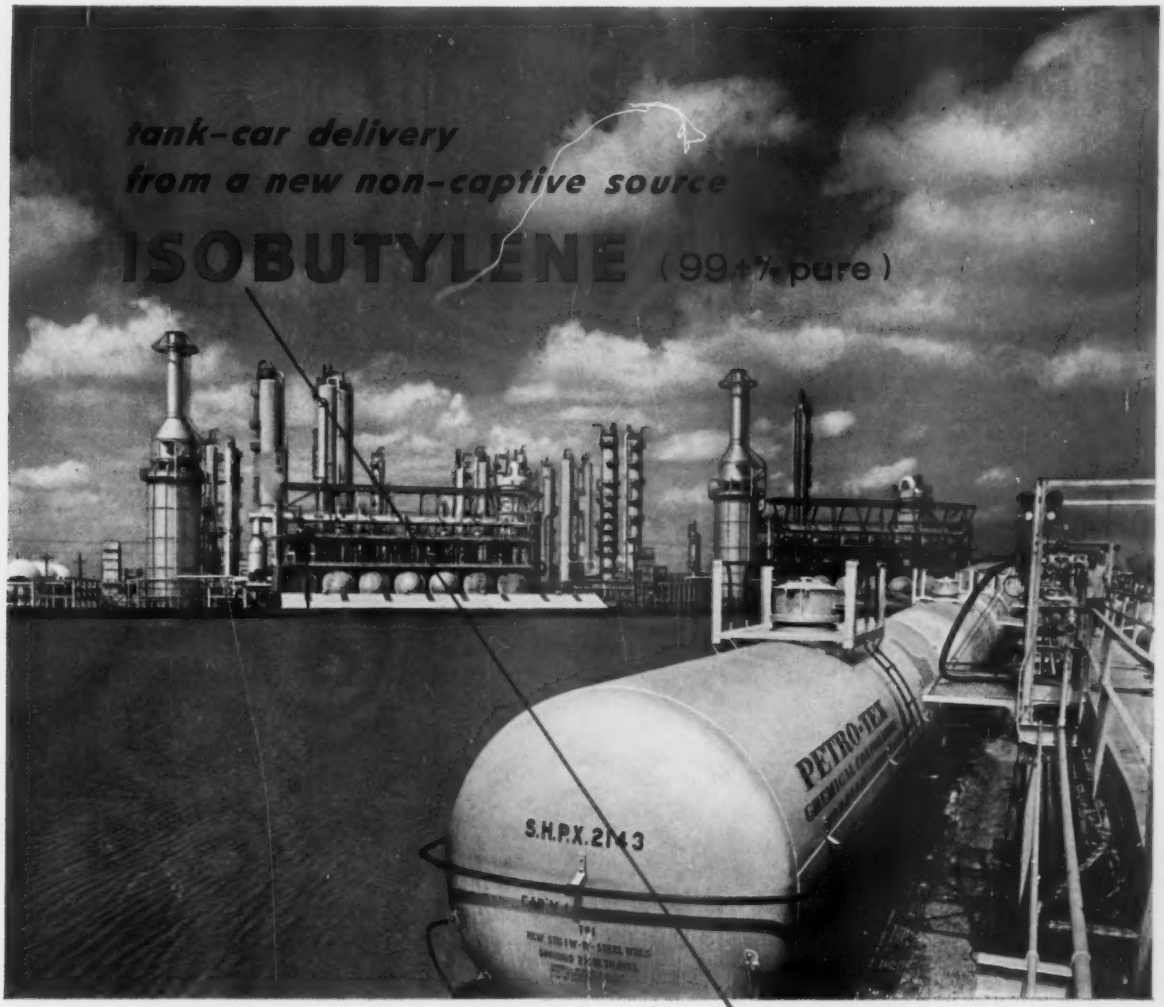
Incorporation of Lignin Into Rubber

U.S. Patents 2,844,548 and 2,844,549, issued July 22, 1958 to Henry E. Haxo, Jr. and George S. Mills, and to Raoul L. Provost, respectively, assigned to United States Rubber Co., relate to the incorporation of lignin as a reinforcing agent in synthetic rubber. The inventions provide methods of preparing readily filterable coagulum particles of a mix containing 25 to 75 parts of lignin per 100 parts of rubber from synthetic rubber latex and aqueous alkali solution of the lignin.

Other Patents Of Interest

Subject	Inventor or Assignee	Patent No.	Date
Vulcanization of rubber	Allon Skipsey	2,867,595	1/6/59
Tubeless tire and rim	Firestone Tire & Rubber Co.	2,868,258-61	4/13/59
Paving composition containing synthetic rubbery polymer	Firestone Tire & Rubber Co.	2,868,749	4/13/59
Stable latex composition	B. F. Goodrich Co.	2,868,754	4/13/59

Copies of any patents, including those described here, are available from the Commissioner of Patents, Washington 25, D. C., for 25 cents each. Do not send stamps.



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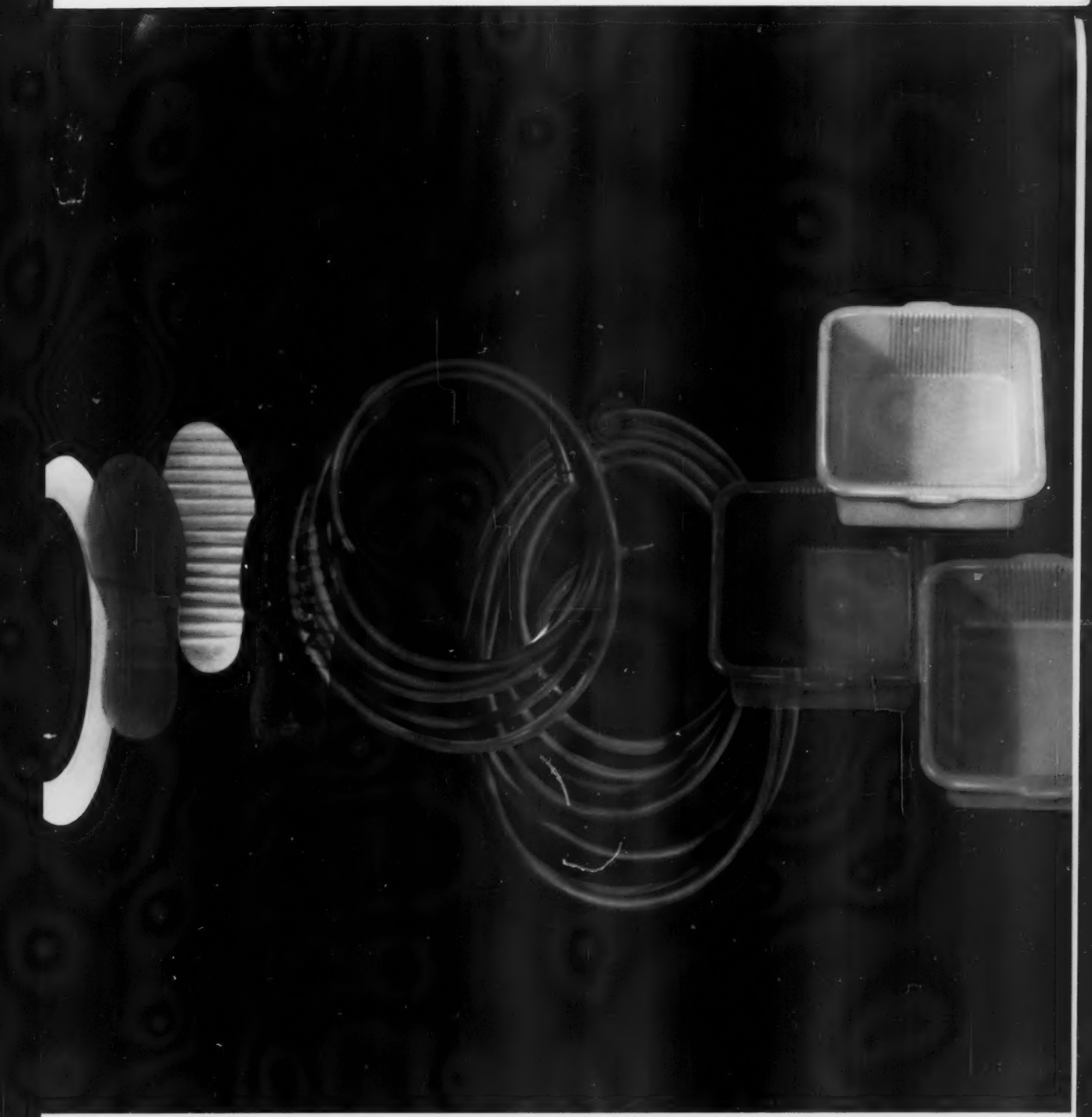

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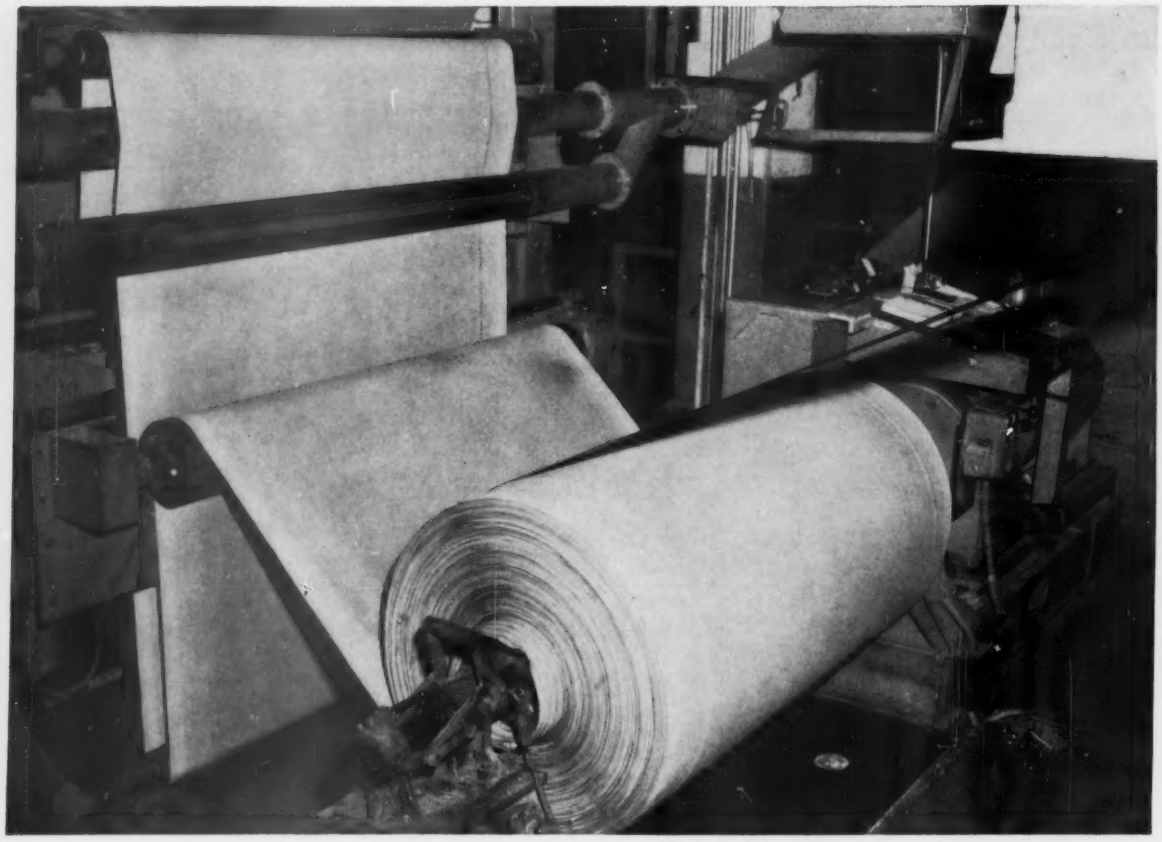

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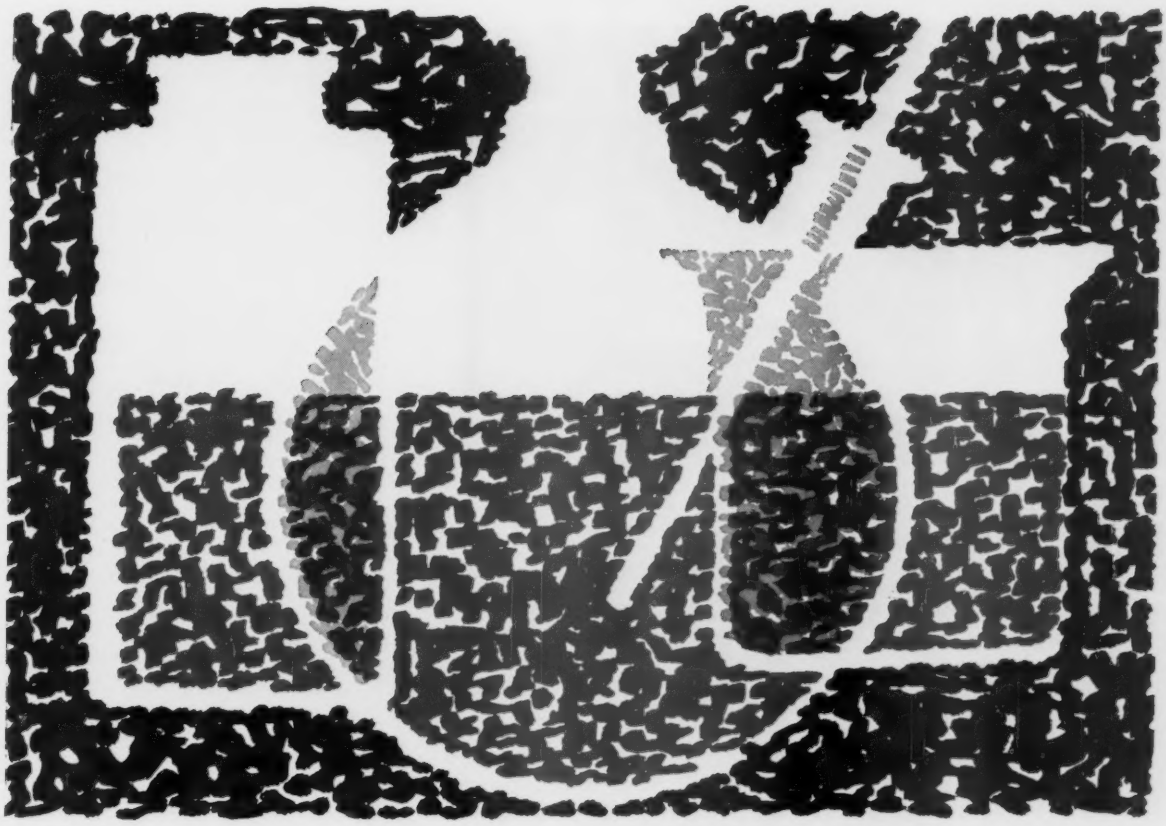

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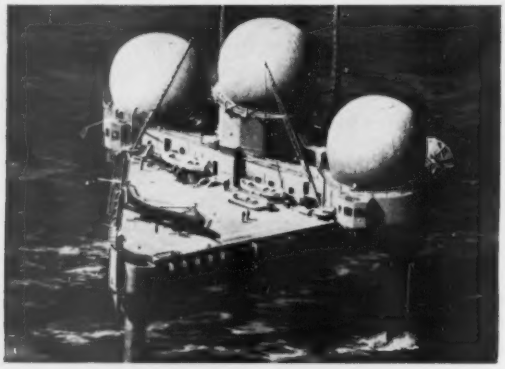
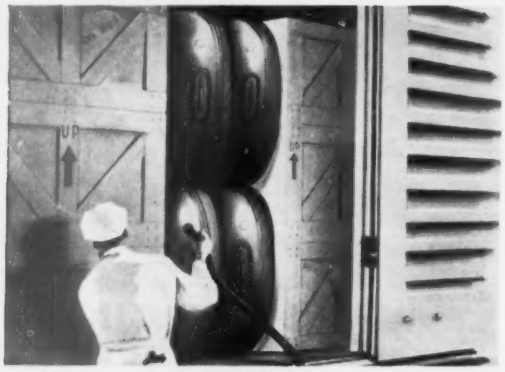


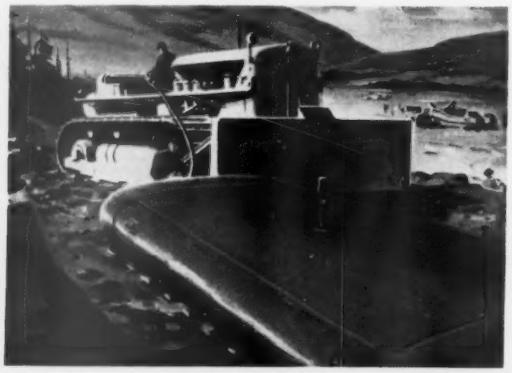
"Texas Tower" radomes of rubberized nylon are supported by interior air pressure. Nylon base fabric by Wellington Sears.

INFLATABLES



Inflatable dunnage bags are made of neoprene-coated nylon enclosing rubber air chamber. Wellington Sears base fabric.

COLLAPSIBLES



Collapsible fuel tank, made of rubberized nylon fabric, is a filling station dropped from the air. Base fabric by Wellington Sears.

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coming events

Sept. 21-25. 14th Annual Instrument-Automation Conference and Exhibit, International Amphitheatre, Chicago, Ill.

Sept. 22-Oct. 3. London World Trade Fair, Alexandra Palace, London, England.

Sept. 24. Fort Wayne Rubber & Plastics Group.

Sept. 24-25. American Society for Quality Control, Chemical Division, Annual Conference, Shamrock Hilton Hotel, Houston, Texas.

Sept. 27-30. American Institute of Chemical Engineers, St. Paul, Minn.

Sept. 28-30. American Oil Chemists' Society, Hotel Statler, Los Angeles, Calif.

Sept. 28-Oct. 2. 14th Annual National Hardware Show, New York Coliseum, New York, N. Y.

Oct. 1-2. Society of the Plastics Industry, 15th New England Section Conference, Wentworth - by - the - Sea, Portsmouth, N. H.

Oct. 2. Akron Polymer Lecture Group, "The Mechanical Strength of Polymers", University of Akron, Akron, Ohio.

Oct. 2. Detroit Rubber and Plastics Group, Fall Meeting, Detroit Leland Hotel, Detroit, Mich.

Oct. 2. Philadelphia Rubber Group, Technical Meeting, Poor Richard Club, Philadelphia, Penna.

Oct. 6-9. Second International Symposium on "High Temperature Technology", sponsored by Stanford Research Institute, Asilomar, Calif.

Oct. 6. Los Angeles Rubber Group. Meeting sponsored by Plastic and Rubber Products Co., Biltmore Hotel, Los Angeles, Calif.

Oct. 7-9. American Vacuum Society, Sixth National Symposium on Vacuum Technology, Sheraton Hotel, Philadelphia, Penna.

Oct. 7. Chemical-Finishing Conference sponsored by the National Cotton Council, Mayflower Hotel, Washington, D. C.

Oct. 8. Southern Ohio Rubber Group, Fall Technical Meeting, Gibbons Hotel, Dayton, Ohio.

Oct. 9-10. Southern Rubber Group, Technical Meeting, Hotel Peabody, Memphis, Tenn.

Oct. 11-16. American Society of Testing Materials, Third Pacific Area National Meeting, Sheraton-Palace Hotel, San Francisco, Calif.

Oct. 12-14. 8th National Clay Conferference, University of Oklahoma, Norman, Okla.

Oct. 12-15. Wire Association, Annual Convention, Statler-Hilton Hotel, Cleveland, Ohio.

Oct. 12-20. "Machevo", Royal Netherlands Industries Fair, Utrecht, Netherlands.

Oct. 13. Buffalo Rubber Group, Fall Meeting, Hotel Westbrook, Buffalo, N. Y.

Oct. 13-14. Society of Plastics Engineers, National Technical Meeting, Ambassador Hotel, Los Angeles, Calif.

Oct. 16. Boston Rubber Group, Fall Meeting, Somerset Hotel, Boston, Mass.

Oct. 16. New York Rubber Group, Fall Meeting, Henry Hudson Hotel, New York, N. Y.

Oct. 17-25. "Kuneststoffe 1959," International Trade Fair of the Plastics Industry, Duesseldorf, West Germany.

Oct. 18-22. Electrochemical Society, Inc., Deshler-Hilton Hotel, Columbus, Ohio.

Oct. 19. International Symposium on Aging of Plastics, Sponsored by High Polymers Division of IUPAC, Duesseldorf, Germany.

Oct. 19-21. National Paint, Varnish & Lacquer Association, Annual Convention, Chalfonte - Haddon Hall, Atlantic City, N. J.

Oct. 19-21. Ninth Canadian High Polymer Forum, Guild Inn, Toronto, Ont., Canada.

Oct. 19-23. 47th National Safety Congress and Exposition, Conrad Hilton Hotel, Chicago, Ill.

Oct. 20. Chemical Institute of Canada, Panel Discussion on the Canadian Chemical Industry, Ontario, Canada.

Oct. 20. Elastomer & Plastics Group, Northeastern Section, ACS.

Oct. 20-22. 10th National Conference on Standards, Sheraton-Cadillac Hotel, Detroit, Mich.

Oct. 21-25. 4th Annual Instrumentation and Automation Show and Conference, Palazzo del l'Arte al Parco, Milan, Italy.

Oct. 23. Akron Rubber Group, Sheraton Hotel, Akron, Ohio.

Oct. 26-31. International Organization for Standardization, Technical Committee 45, Henry Hudson Hotel, New York, N. Y.

Oct. 26-28. Ninth Canadian High Polymer Forum, Guild Inn, Toronto, Ont., Canada.

Oct. 27. Association of Consulting Chemists and Chemical Engineers, Annual Symposium and Banquet, Sheraton-McAlpin Hotel, New York, N. Y.

Nov. 2-4. Canadian Manufacturers of Chemical Specialties, Annual Meeting, Royal York Hotel, Toronto, Ontario, Canada.

Nov. 3. Los Angeles Rubber Group, Biltmore Hotel, Los Angeles, Calif.

Nov. 5. Rhode Island Rubber Group, Fall Meeting, Pawtucket Country Club, Pawtucket, R. I.

Nov. 6. Akron Polymer Lecture Group, "How Tires Wear", University of Akron, Akron, Ohio.

Nov. 6. Connecticut Rubber Group, Sports Night.

Nov. 6. Philadelphia Rubber Group, Annual Dance.

Nov. 8-13. Joint International Meeting of Division of Rubber Chemistry, ACS; Committee D-11, ASTM, and Rubber and Plastics Division, ASME, Shoreham Hotel, Washington, D. C.

Nov. 8-10. Toy Production Show, New York Trade Show Building, New York, N. Y.

Nov. 11-15. National Association of Waste Material Dealers, Fall Meeting, Diplomat Hotel, Hollywood Beach, Fla.

Nov. 16-20. Automation Show & Conference on Materials Handling, New York Trade Show Building, New York, N. Y.

Nov. 17. Elastomer & Plastics Group, Northeastern Section, ACS.

Nov. 24. Manufacturing Chemists' Association, Ninth Semi-Annual Midwinter Meeting, Hotel Statler, New York, N. Y.

Nov. 29-Dec. 4. ASME Annual Meeting, Chalfonte-Haddon-Hall, Atlantic City, N. J.

Nov. 30-Dec. 4. 27th Exposition of Chemical Industries, New York Coliseum, New York, N. Y.

Dec. 1-3. U. S. Army Signal Research and Development Laboratory, Wire and Cable Symposium, Berkeley-Carteret Hotel, Asbury Park, N. J.

Dec. 3. Fort Wayne Rubber & Plastics Group.

Dec. 6-9. American Institute of Chemical Engineers, Annual Meeting, San Francisco, Calif.

Dec. 8. Buffalo Rubber Group, Christmas Party.

Dec. 11. Boston Rubber Group, Christmas Party, Somerset Hotel, Boston, Mass.

Dec. 11. Detroit Rubber and Plastics Group, Christmas Party, Hotel Statler, Detroit, Mich.

Dec. 11. Los Angeles Rubber Group, Christmas Party, Beverly Hilton Hotel, Beverly Hills, Calif.

Dec. 12. Southern Ohio Rubber Group, Winter Meeting.

Dec. 18. New York Rubber Group, Christmas Party.

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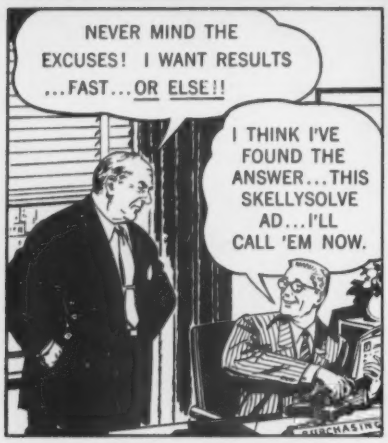

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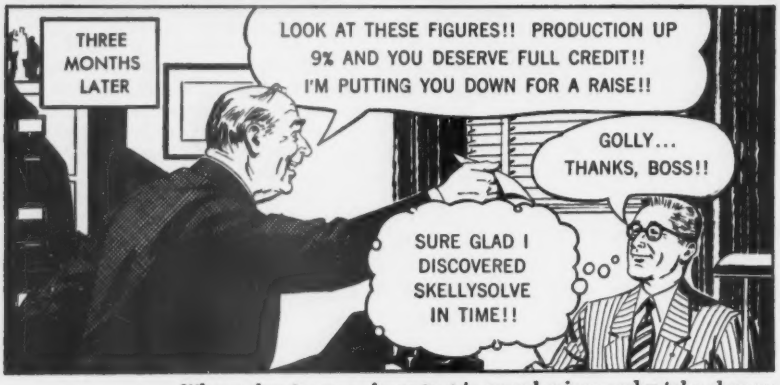
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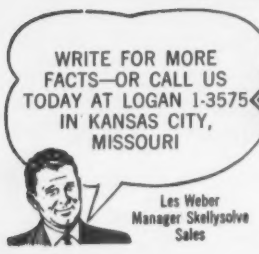

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SKELLYSOLVE-H. For general use in manufacturing operations and cements, where faster evaporation rate than that of Skellysolve-C is desired. Closed cup flash point about —16°F.

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How NS solved another bead wire problem

NEW PACKAGE inside steel "steam box" completely protected bead wire from rust during six week test.

VACUUM SEALING of new polyethylene bag keeps bead wire safe from corrosive atmospheres. After sealing, cardboard outer wrapper is added for additional protection before palletizing.

NEW NATIONAL-STANDARD PACKAGE PREVENTS BEAD WIRE CORROSION

A new bead wire packaging development from National-Standard permits storage of bead wire indefinitely without danger of rust or corrosion.

Now National-Standard is shipping bead wire in a vacuum-sealed polyethylene bag with a cardboard outer-wrapper to protect against scuffing and tearing. The polyethylene pack was made possible by National-Standard's development of reel-less coil packaging over six years ago.

EXTENSIVE TESTING of the new package over a period of many months has proved the new polyethylene package's superiority over old-style wrappers. National-Standard research engineers placed a new vacuum package, together with an old-style package, in the highly humid environment of a paper mill for several weeks. At the end of the test period, bead wire in the old package showed extensive rust. But wire inside the polyethylene bag was in excellent condition.

For additional proof, National-Standard put the new package through a torture test. For *six weeks*, new vacuum bag (wrapped with cardboard outer package) withstood extremely high humidity inside a steel steam cabinet *without any evidence of wire corrosion.*

NEW PACKAGING TECHNIQUE is a five step process: (1) polyethylene bag is placed over two bead wire coils; (2) a desiccant is placed inside bag; (3) bag is vacuum-sealed; (4) protective cardboard wrapper is placed around packaged coils; (5) entire unit is steel-strapped to pallet.

ANOTHER NATIONAL-STANDARD FIRST in the field of bead wire development, the new vacuum package becomes a significant addition to the long list of National-Standard contributions to the rubber industry. For over fifty years, National-Standard has been the leader in bead wire research and development. Whenever you have a *wire-in-rubber* problem, let National-Standard put this experience to work for you. For additional information, write National-Standard Company, Niles, Michigan.

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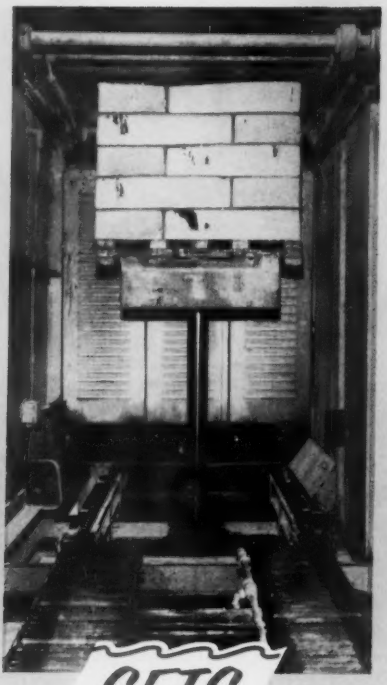

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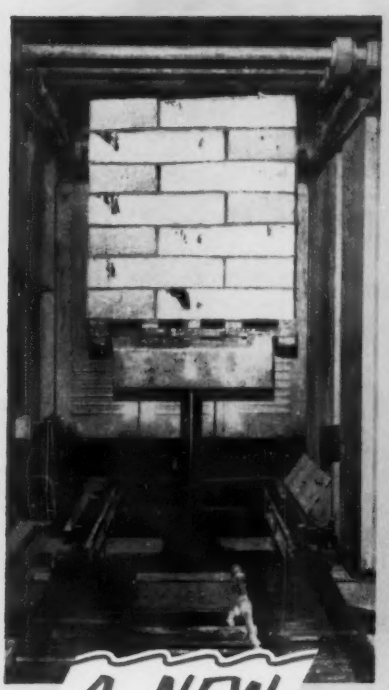

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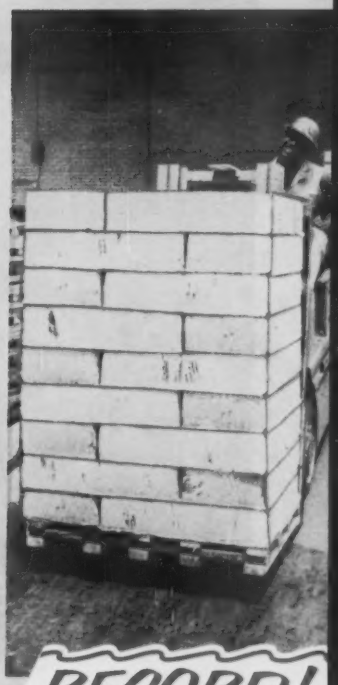

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Letters to the editor

In a letter to the editor which appeared in the August, 1959, issue of this journal, Andries Voet of the J. M. Huber Corp. commented upon the article by A. Fiorenza which appeared in our March, 1959, issue under the title "The Absorption Spectrum of Carbon Black Dispersions." We have now received the following letter from Dr. Fiorenza.

Re Black Dispersions

Dear Sir:

The observations of Dr. Voet regarding our paper "Identifying Carbon Black" which deals with, in. al, ultraviolet spectra of dispersions in mineral oil of carbon blacks presume on our behalf a criticism to his previous work. This was not our intention. But we admit that the expressions used were somewhat imprecise and might allow these suppositions.

Owing to the extreme similarity of the spectra of carbon black dispersions to those of the respective extract solutions in mineral oil, we meant to assert only that the spectrum was not due to the elementary carbon lattice.

We think that such a lattice can act only as a geometrical screen whereas the origin of the spectrum should be attributed not only to the extractable substances of the black, but also to the organic end-groups existing at the surface of the black particles, which are very similar in structure to the said substances and may also interact with the solvent (J. V. Hallum and H. V. Drushel, J. Phys. Chem. Vol. 62, p. 110 (1958).

To these end-groups, together with the extractable substances, we applied the loose wording "non black". The extraction, of course, does not remove all of this "non black" but only the free (extractable) organic parts. It is therefore impossible to test this hypothesis on quantitative data. In fact completely extracted blacks still show the ultraviolet spectra.

After having carried out many tests recently we can now give, to Dr. Voet's further assertions, the following answers.

Besides the blacks having very low extractable (we have found some extractable even in acetylene black and in Graphon, 0.06% in both) there exist also blacks having high extractable, such as CK_4 and P_{33}, which contain 1% or more.

We agree that a concentration of extract of 10^{-8} cannot be detected, but, on the other hand, a concentration of 10^{-6}, and even less, has actually been detected by us (for instance in the case of P_{33}).

Benzenic extracts, carefully centrifuged for 5 hours at 20•000 m/s² still show ultraviolet spectra, almost identical to those obtained in the first experiments, for which the extracts were centrifuged only one hour (at 20•000 m/s²).

Therefore Dr. Voet's affirmation that the extracts, after complete removal of

Continued on page 922

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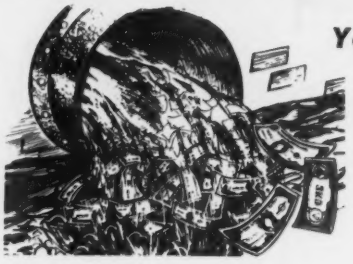

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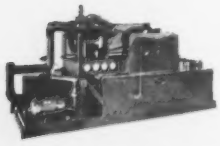

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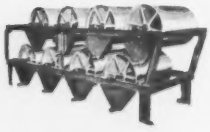

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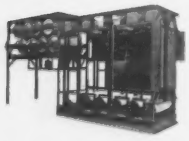

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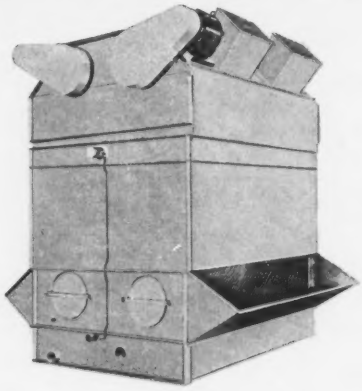

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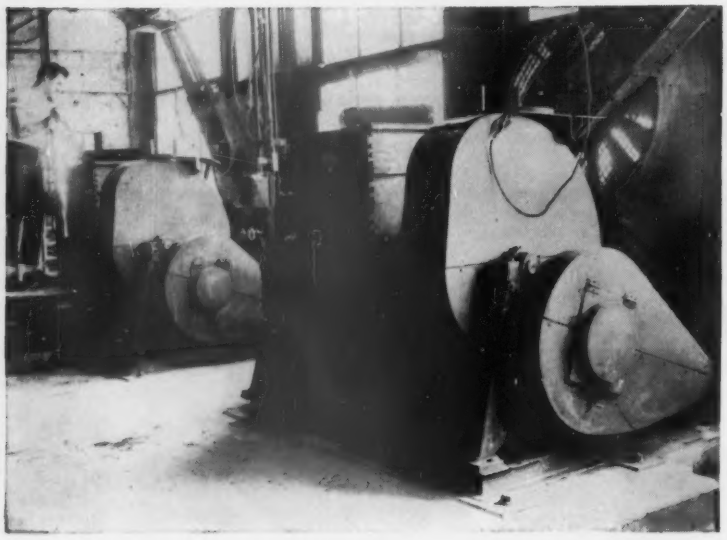

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all traces of black by prolonged centrifuging, showed no ultraviolet absorption leaves us very puzzled, even more so when we are not told the centrifuging conditions used by him.

As further control, we carried out electron micrographs of every concentrated extract solutions of the Kosmos 60 and P_{33} blacks. Carbon black particles, single not aggregated, were found, but in a quantity, verified by comparison, certainly less than 1% of solid content of extract solution, and therefore such as not to affect the ultraviolet obsorptions.

Moreover the necessary quantity of extractable to obtain a spectrum having the same absorption of that of the corresponding black, is about 10•000 times larger in the case of low extractable carbon blacks (Kosmos 60, Graphon, Acetylene black) and it is, on the other hand, only about 50 times in the case of high extractable carbon blacks (CK_4 — P_{33}).

This fact shows furthermore that the extractable spectra cannot be caused by very dilute dispersion of carbon blacks. In fact, the probability of a remainder of black in a benzenic solution, under equal centrifuging conditions, is about the same as for the first-named blacks in the case of CK_4 and much less in the case of P_{33} black, which has much bigger particles as shown by the electron micrographs.

Summarizing, while admitting some deficiencies in describing the concepts referred to in our previous paper, we think that it would be advisable, besides clarifying experiments which may be not different in accuracy but simply different, to carry on further work in order to better understand the discussed phenomena.

DR. ALDO FIORENZA
Rubber Laboratories
Pirelli S.p.A.
Milan, Italy.

And From Dr. Voet

Dear Sir:

The extractables found by Dr. Fiorenza in Acetylene Black and Graphon cannot possibly occur, in view of the extremely high temperature of their formation, close to 3000° C for Graphon. Equally, at such temperatures there are no surface groups, which eliminates completely Dr. Fiorenza's speculations about the influence of such groups on the UV spectrum of carbon blacks.

We first found extractables of similar magnitude as Dr. Fiorenza, but traced them back to paper extraction thimbles which contain traces of resinous materials. With the use of alundum thimbles no extractables were detected in either Acetylene Black or in Graphon.

The quartz cells used in the measurements are easily coated on the inside with a barely visible film of black. Careful cleaning with an aqueous detergent solution before each test is required to eliminate spurious UV carbon black spectra, which could be the cause of Dr. Fiorenza's difficulties.

DR. ANDRIES VOET
J. M. Huber Corp.,
Borger, Texas.

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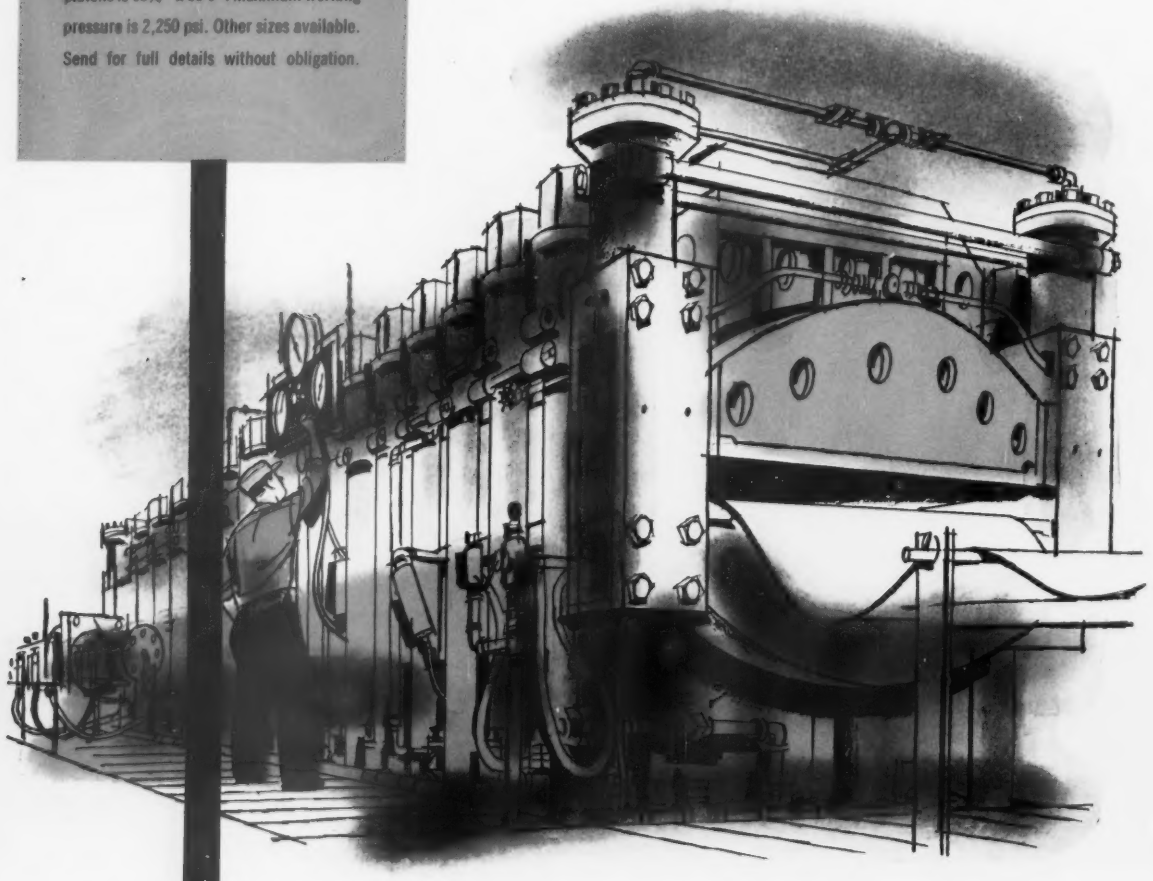

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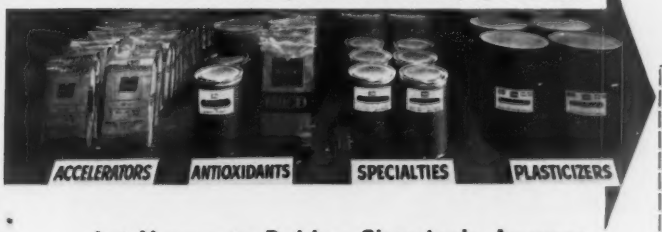

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THE STEEL STRIKE HASN'T HURT PROSPECTS FOR THE FALL—that's the view of top government economists. They think business will bounce back rapidly in the wake of the settlement and after other affected lines get back to normal. The large inventories of steel held by users have limited the strike's impact. So, on balance, the third quarter won't look too bad. There won't be a slump. It's just that the economy's gains will be smaller than those of last Spring.

The economy has plenty of underlying strength. Auto sales will continue high, helped by the new small cars. Road-building will be another plus. Business will still be trying to build inventories, and outlays for new plants will keep expanding.

Here's how some leading indicators will look by the year-end:
- Factory output will rise 3% or so, for a 1959 gain of 11-12%.
- Employment, already at a record, will go up another million.
- Unemployment will fall below 3 million, the lowest since '57.
- Prices will keep climbing, despite seasonal declines in food.
- Gross National Product—total output of goods and services—could hit an annual rate of $500 billion by the close of '59.

THE FAST FINISH TO 1959 WILL SPILL OVER TO '60, turning into a boom. Businessmen will find men, money, and materials, in ever-tightening supply. Consumer buying—mainly for hard goods like autos—will give the economy a substantial lift. Business' own spending for new plant and equipment will furnish even more push. Most economic indicators will be setting records.

INTEREST RATES ARE LEVELING OFF SOME, but they'll resume the rise in the Fall. That's the view of Washington experts who follow money trends. One reason for the slowing will be the fact that industry will be living off big inventories built up before the steel strike. They will pay off loans. And the Treasury won't be borrowing or competing with business till October.

Once the rise starts again, the experts foresee an increase of another ½% or so—no more. Corporations have plenty of cash from their big profits and savings. And resistance of borrowers usually sets in when rates rise. But with credit already tight, it won't take much to add to the pinch which business already feels. Loans will be smaller, hard to get.

CORPORATE PROFITS HAVE REALLY BEEN ZOOMING, justifying even the most optimistic forecasts made earlier this year. In the second quarter alone—April-June—corporations earned 75% more than in the depressed second period of 1958. Biggest year to year gains came in autos (up 300%), steel (165%), rubber (110%), glass (100%), nonferrous metals (95%), machinery (85%), plane making and chemicals (75% each), building materials and paper (40% each), retailing (35%), and metal products and electrical equipment (30% each).

New profits records are being set this year, even though the business rise is slowing this quarter. First-half profits topped 1958 by 50%; the second-half gain will be only 25-30%. This would mean $51-$52 billion for all 1959—40% over 1958.

capitol cues (cont'd)

DIVIDENDS WILL BE RISING SUBSTANTIALLY, but not by as much as profits. Company managements are moving cautiously, to judge from the current trends. They're putting much of their profits into new plant to keep pace with sales. But this still will leave plenty for year-end extras. Payments will top 1958 by 15% to 20%. The cyclical industries that move up and down along with the business cycle—steel, autos, rubber, and railroads—will lead the parade.

MORE NEW RECORDS IN THE STOCK MARKET are being forecast by analysts. They see further rise in share prices as a result of the large increases in profits and the prospect of big hikes in dividend payments. In addition, business is sure to rebound in the wake of the steel strike. What's more, history favors a rise; upturns have occurred in 37 of the last 41 Summers. The Dow-Jones Industrials Index may hit 700 this Fall, if history is a guide.

SMALL BUSINESS INVESTMENT COMPANIES ARE DISAPPOINTING some potential borrowers. The new banks, authorized last year by Congress, are beginning to operate in numbers. Interest rates charged on loans average 10% to 12%, with 15% asked in some cases. Other "strings" may include representation on the borrower's board, plus vetoes over dividend policies and any future long-term financing. The first banks doing business find it necessary to attach such strings to loans because the firms financed are usually risky.

REGULATION OF STATE TAXING OF INTERSTATE FIRMS may be voted this year or next by Congress. Fifteen Senators are pushing a resolution to establish a commission to recommend uniform standards for such taxes—a big headache for business. The taxes are hard to comply with and more are coming all the time.

> The states would be asked to tax, for now, only firms with inventories or an office in the state. (Congress may move in under the Constitution's interstate commerce clause.)

MORE SPACE CONTRACTS FOR SMALL COMPANIES WILL RESULT from a program being launched by the National Aeronautics and Space Agency. It calls for (1) setting up a list of firms interested in such business, (2) screening contracts NASA lets to see which small firms could handle, (3) staging of conferences at which contract terms will be explained, and (4) encouraging pools of small companies to bid jointly. Small firms can do well in space work; many items must be custom-made and are suited for small-scale output.

THE NEXT LABOR CRISIS WILL COME THIS FALL in the railroad industry. The issue that will bring a deadlock is "featherbedding." Rail executives say they'll take a strike if the unions do not give in; they say make-work under outmoded rules costs $500 million yearly and blocks rate cuts needed to meet competition from trucks and barges. Railroad unions are ready to make only small concessions. Leaders will cite improving profits and high productivity to show the rules do not hinder operations. It's hard to see a long tie-up, but it's also hard to see a basis for a peaceful settlement.

THE FIRST UP-TO-DATE BUSINESS DATA IN A DECADE will soon be published by the Census Bureau. It will be carried in the first report on the Census of Business, Manufacturing, and Mineral Industries, made in 1958. It will show primary product data for 700 major industries. Later reports will hit production, markets, costs, and capital spending. Meantime, the government is preparing for its regular 10-year Population and Housing Census in 1960.

Buxbaum matting resists the "batter of little feet" with Ameripol Micro-Black masterbatch

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Key to Micro-Black's better abrasion resistance is superior dispersion of carbon black in the rubber, achieved by an exclusive process—high liquid shear agitation at the latex stage. Products made with Micro-Black are more saleable because they have controlled uniformity, greater resistance to wear.

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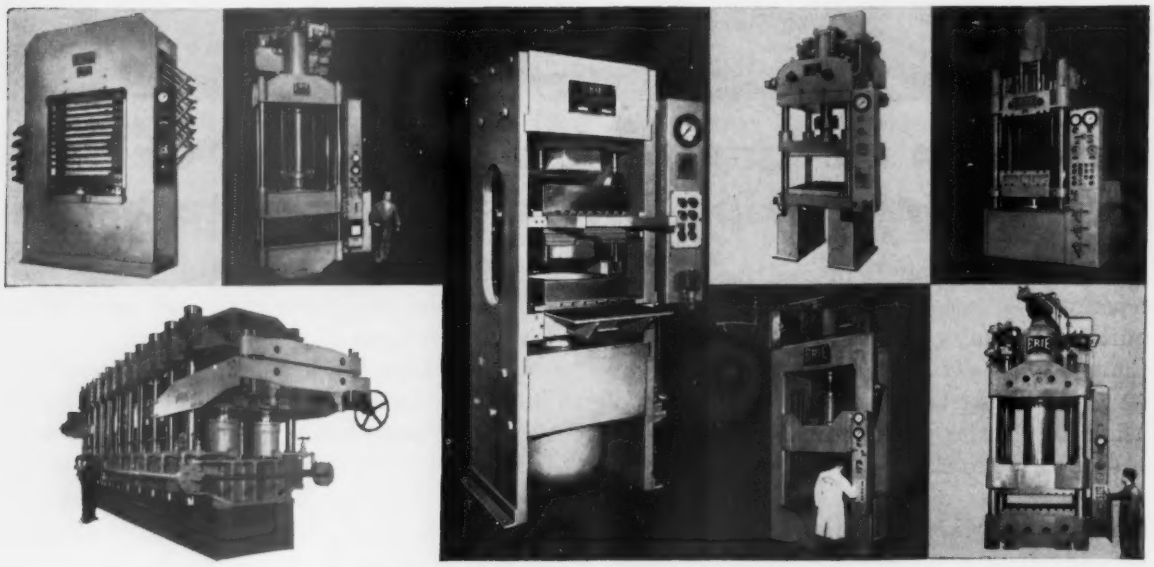

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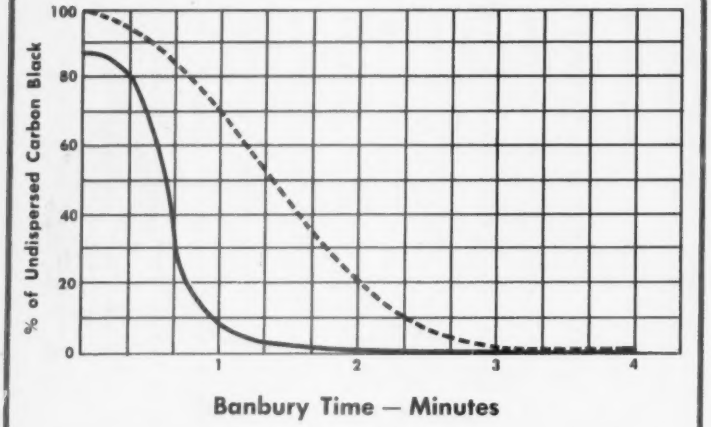

Dramatic reduction in mixing time required is illustrated by this comparison of SYNPOL with a dry mix of same composition. Dry mix requires 4 minutes of Banbury time to equal dispersion reached by SYNPOL in 2.

SYNPOL ——— Dry Mix — — —

98% dispersion of carbon black in just 2 minutes. Based on tests to date, illustrated on the chart at left, new SYNPOL Black Masterbatches make it possible for you to enjoy substantial mixing economies that extend into all areas of your processing operations.

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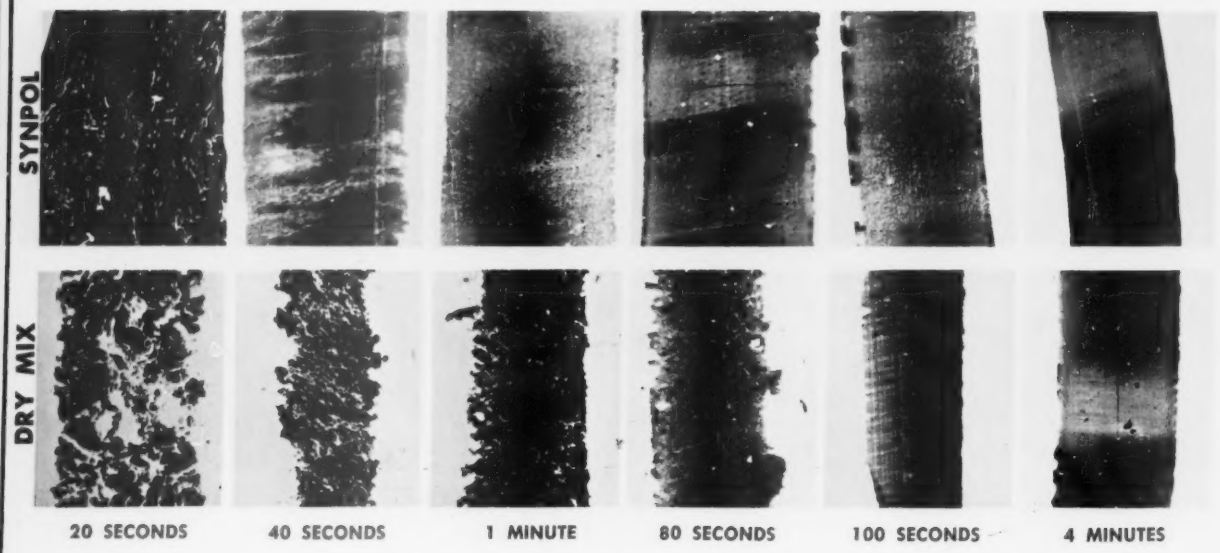
The series of photographs below illustrates clearly the time-and-money-saving advantages of the new SYNPOL Black Masterbatches over conventional dry mixes.

ACTUAL UNRETOUCHED PHOTOGRAPHS OF MICROTOME SECTIONS, MAGNIFIED 99 TIMES, SHOW CLEAR SUPERIORITY OF SYNPOL MASTERBATCH DISPERSION AFTER ANY MIXING TIME.



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Ultra-dispersed Black Masterbatch

With new SYNPOL Black Masterbatches you enjoy many processing cost-savings above and beyond those resulting from reduced Banbury time . . . and you get increased product durability, too. Numerous tests indicate that tires and other products made of SYNPOL Black Masterbatch *outwear* those made from a conventional dry mix. And the use of oil-extended ISAF—completely practical with SYNPOL Black Masterbatches—promises still added improvement in tread wear.

Processing Advantages Include:

- smoother, faster extrusions for equal mixing times
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End-Product Features Include:

- consistently high abrasion resistance
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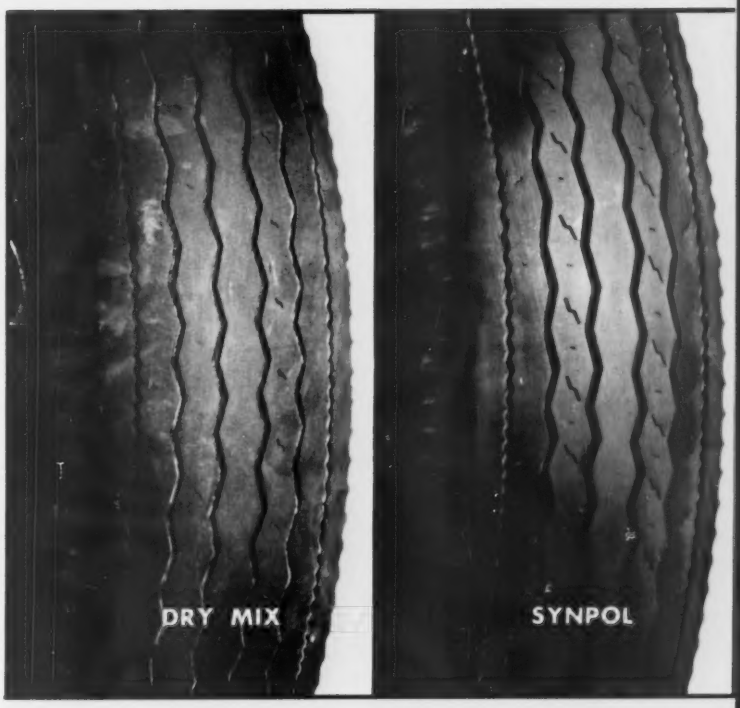
The new SYNPOL Ultra-Dispersed Carbon Black Masterbatches have been fully production proved—with more than one hundred million pounds already in use in tires, camelback, and mechanical goods. Start now to enjoy both the processing *and* the product advantages these new SYNPOL Ultra-Dispersed Black Masterbatches offer *you*. For technical data and further information, contact your TEXUS Representative or the address below today.



These unretouched tire photographs, taken during actual road tests in Texas under all driving conditions, illustrate the superior tread wear characteristics of SYNPOL Black Masterbatch over conventional Dry Mix. These and other road tests of 1,400,000 tire-miles give *documented evidence* of up to 10% increase in tread wear on tires made with SYNPOL.

SYNPOL Ultra-Dispersed Black Masterbatches

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SYNPOL 8151 . . . Rosin Acid Emulsifier, Staining, Acid Coagulated, 10 pts. Highly Aromatic Oil, 52 pts. HAF Ultra-Dispersed

SYNPOL 8253 . . . Rosin Acid Emulsifier, Non-staining, Non-discoloring, Acid Coagulated, Naphthenic oil-extended, 60 pts. FEF Ultra-Dispersed

SYNPOL 8254 . . . Mixed Soap Emulsifier, Staining, Acid Coagulated, 37.5 pts. Highly Aromatic Oil, 75 pts. HAF Ultra-Dispersed

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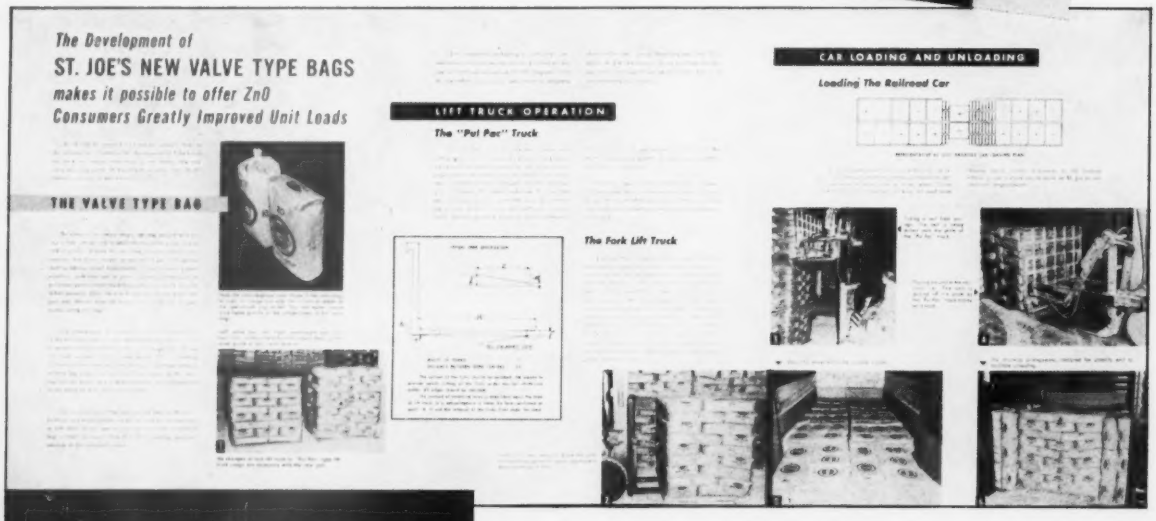
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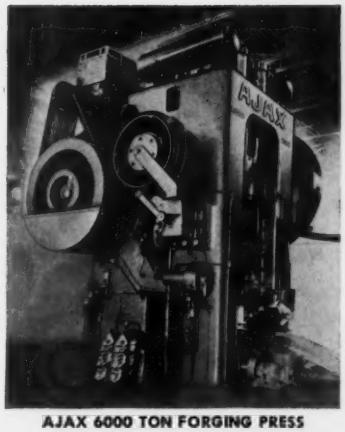

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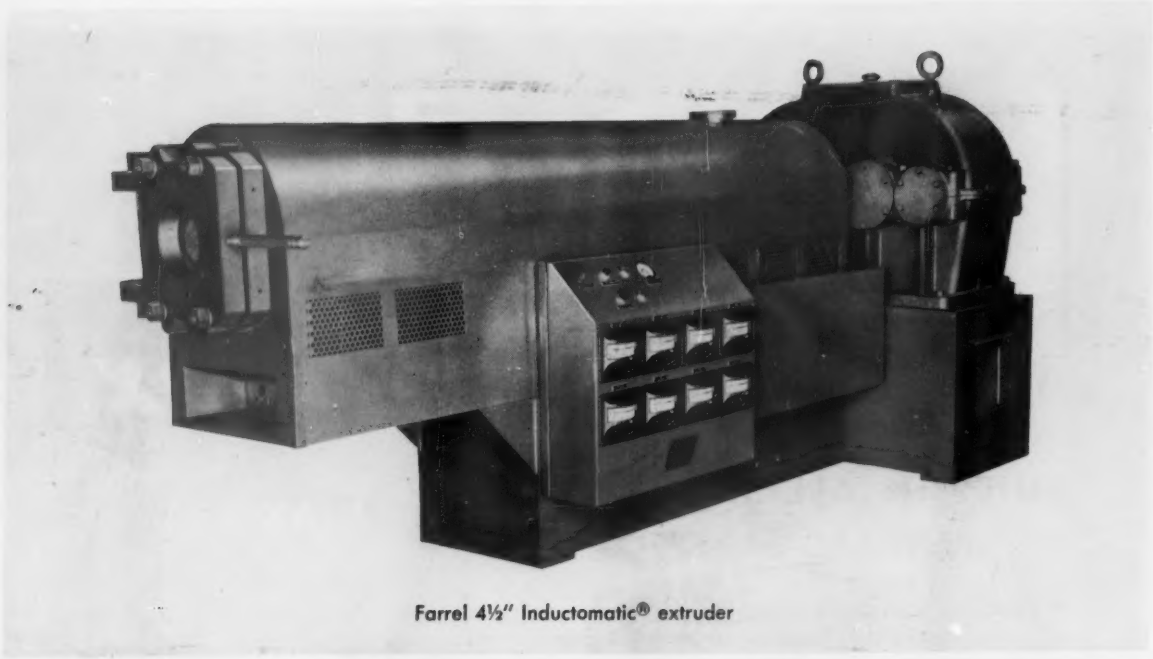

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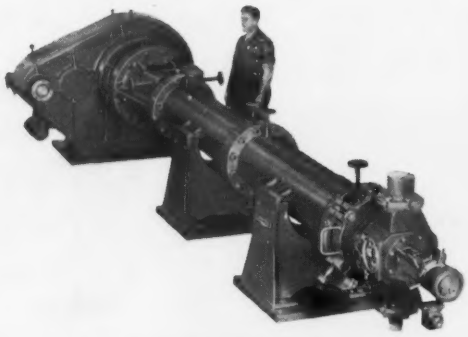

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Among the wide variety of large processing extruders built by Farrel to individual requirements is this cold-feed machine. It was designed to rework cold granular polyethylene with antioxidants and, with or without coloring matter, force the material through a straining screen, and pelletize it in an underwater head at a rate of 1600 pounds per hour.

As Soule Sees It...

by Kenneth J. Soule

Midget Plants Made to Order

It is reported that enterprising chemists at the U. S. Department of Agriculture's research center at Beltsville, Md., have produced a chemical which will stunt the stems of growing flowers. If the chemical, 2, 4 dichloro-bensyltributyl phosphonium chloride, is sprinkled on the soil in which the bulbs are to be planted, the stems of the resultant flowers will be about half the usual length, but the size of the blossoms remains unchanged.

This "wonder drug" is to be marketed under the trade name Phosphon-D by the Virginia-Carolina Chemical Corp. Speculating into the future, the scientists at Beltsville are said to be hopeful that one day it will be possible to chemically control the height of landscape items such as bushes, shrubs and fruit trees; farm crops like corn and cotton, and even lawn grass. One dreamer even envisions a lawn which will require mowing only a couple of times during a growing season. An intriguing prospect! However, Mother Nature has been known to get obstreperous if pushed too far, so it is not outside the realm of possibility that the weeds will respond to the grass-stunter by growing twice as fast and three times as large as usual.

On second thought, it might be well to hang onto your power mower and other garden tools until the agronomists have a chance to study all the effects of their new chemical over a considerable period of time.

Sea-Going Snakes Again

Some readers may remember an item in this column in February, 1959, concerning a novel European flexible towed container called a "Dracone." It was built of woven nylon fabric, coated on the outside with neoprene, and lined with a chemically resistant synthetic rubber, and was designed to provide an economical means of transporting lighter-than-water liquid chemicals via water routes.

After a considerable amount of preliminary testing and short run trials, the "Dracone" has now successfully completed its maiden voyage. This was a 260 mile-trip from Billingham in northeastern England across the North Sea to Flushing, Holland. Since it was desired to study all aspects of unloading as well as loading, at the Imperial Chemical Industries Ltd. wharf at Billingham, an immediate turn-around trip was made to the point of departure, thereby providing an additional 260 miles of open sea tests.

The cargo, in this case, was some 40 odd tons of liquid hydrocarbons. In spite of the extremely rough water encountered, no difficulty of any kind was experienced during the test run, which augurs well for the successful establishment in Europe of this type of conveyance on a regular schedule in the not-too-distant future.

Roofs

A couple of eons ago when your ancesters and mine were living in caves, the roofing problem as such did not exist. To be sure the family caves all had roofs, but since the roof was an inherent, built-in part of the entire dwelling no one worried much about it, preferring to spend any excess time making drawings on the walls or sweeping up the stone floor of the home cave.

Living in this ancient era must have been simple and primitive to say the least. Nevertheless it appears that the basic dwelling of this prehistoric time, the cave, is one of the few types of human habitation which has continued in active use down through the ages. In fact, there are cave dwellings in Matera, Italy, today which are said to have been used as homes almost continuously from the Stone Age up to the present day.

However, for one reason or another some ambitious cave dweller must have become dissatisfied with his hole in the earth or his niche in the wall. He may have discovered that one way to get more needed room, as well as to satisfy his *Cavefrau's* desire for a little variety in the home design was to build an addition on to the original dwelling. This was done by building a wall of piled rock a short distance away from the cave and roofing over the space between the cave and the wall with logs or skins or branches, etc . . . Another Stone Ager may have made a crude tree hut by pushing sticks in the ground in a circle, tying their tops together to form a cone and covering the framework with leaves or thatch. Or, from the skins of animals he had slain and a few poles, an early tepee may have been born. In any case, instead of a burrow gouged out of the rock or the ground, we now have separate man-made dwellings embodying built-on roofs.

From these early shelters, the modern buildings for both home and industrial use slowly developed, and the roof became a distinct and critically important feature of the new structures. Since its chief purpose was (and is) to enclose the upper parts of the building as a protection against the elements, it is not surprising that a long list of materials have been tried as outer coverings. These have included shingles of wood, asphalt, asbestos, felting of various kinds, as well as tile, slate, sheet metal in a variety of shapes and materials etc., etc.

It is only recently, however, that rubber, or a rubber-like product has been seriously considered as a roofing material for industrial or private home installations. This has been particularly true where the roof was to serve a two-fold purpose, that is, to offer the usual protection from the weather and also to stand up against considerable foot traffic. In the latter case, the roof is always flat, and technically is as much a sun deck as it is a roof.

One of the more successful of these "rubber" roof systems appears to be the Dex-O-Tex weather-wear

As Soule Sees It (Cont'd)

roofing developed by Crossfield Products Corp. of Roselle Park, N. J. It is installed only by factory trained contractors, and consists basically of a patented slip sheet covered by a thick, troweled-on neoprene composition.

The economy and the long-wearing properties of this roofing have been amply demonstrated by many commercial installations. Some of these are pictured in an interesting article entitled, "Double Duty for Your Roof," in the June-July 1959 *Du Pont Magazine*. Included are a Miami airport ramp, a school roof top lunch area, a helicopter landing port, and the outside decks of the liner *S. S. United States*.

Although it is stated that Dex-O-Tex, is not considered to be practical, from an economical standpoint, for private home use, there are also exceptions to this admirable rule. If you unfortunately have a sun deck, covered with some of the usual roofing materials, and it persists in leaking, my suggestion would be to investigate Dex-O-Tex. While my own sun deck was not quite as large as those on ocean liners, it was big enough to be a problem child. Since receiving the same covering as the outer decks of the *S. S. United States*, it has behaved beautifully for eight peaceful years. (Knock-Knock.)

We also note that butyl rubber compositions are being recommended as do-it-yourself coatings for wood shingle roofs. The well known resistance of this rubber to the deteriorating effects of sunlight and atmospheric ozone should surely justify a careful consideration of its use by any householder who plans repairs of this type.

To summarize, our rubbery roof coverings have been slow in getting a toe-hold in the building industry, but it begins to look now as if their progress from here on may well be impressive.

Safety at Sea

Two novel, but distinctly different types of life boats have made the news recently. One is a German development, which in appearance resembles a miniature submarine. The double hull is fabricated of glass fiber reinforced polyester resin sandwiched around a core of hard PVC foam. Quick entry into the boat is provided by four large hatchways, which when desired can be hermetically sealed to render the craft completely watertight. Dimensions of the vessel are: over-all length 26 feet; inside compartment length, 20½ feet; width 9½ feet; height 4 feet, 11 inches. Nominal seating capacity is 40. The boat is diesel powered, equipped with radio, floating anchor, and the usual survival equipment. Clear plastic domes at bow and stern provide excellent lookout visibility at all times.

The other life boat in question is perhaps more accurately described as a life raft. The particular type involved is the Elliot raft which has been required equipment in the British fishing fleet since January 1, 1957, and is credited with helping to save the lives of 107 fishermen since that time. A similar raft is said to have played a large part in saving the lives of 26,000 Royal Air Force personnel during the last war.

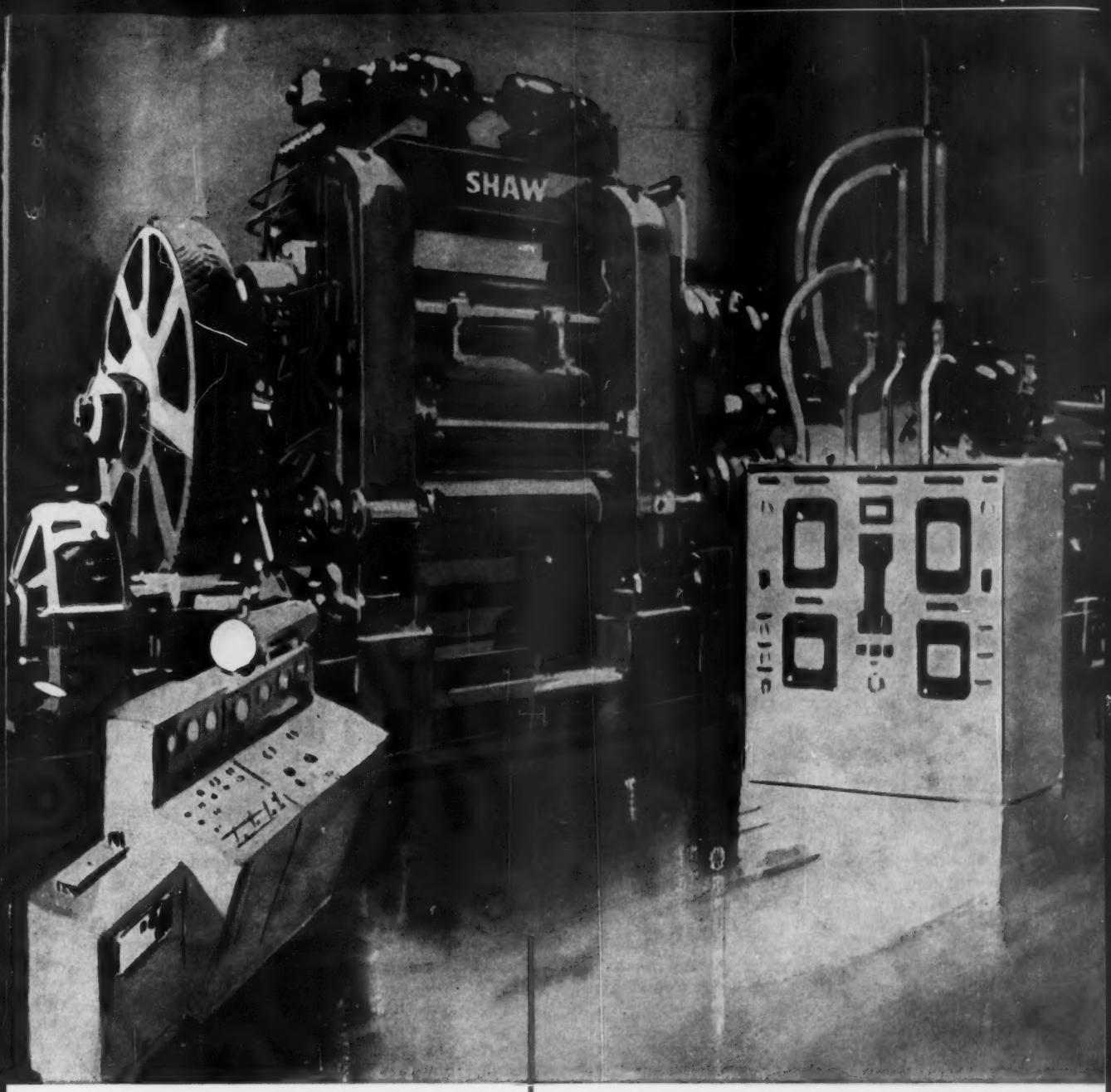
The United States version of the Elliot raft is being manufactured by the Survival Equipment Corp. of Sausalito, Calif., and is at present undergoing Coast Guard tests. It can be inflated by pulling a lanyard, either from the boat deck or by a man in the water. It will inflate automatically as well if the parent vessel sinks. The protective canopy, which completely covers the entire structure, is also designed to catch rain water. Standard equipment includes the usual survival, navigational and signaling devices, including rockets. For complete constructional specifications, see the *Federal Register*, July 9, 1959. If this trend keeps up, (and more power to it), then the high seas will soon be safer than the highways!

Blissful Bovines

History has a way of going in cycles or circles, or at least repeating itself when extended periods of time are considered. A case in point involves our good friend, the cow. Twenty-five or thirty years ago, when the late Colonel Townsend was guiding the destinies of the Manhattan Rubber Co., he became interested in the possibilities of using some type of rubber mat to replace the straw commonly employed as bedding material in cow stalls. There seemed to be considerable merit in the conception, and, as was his custom, the Colonel pushed the project with much vigor. He also managed to sell the idea to the technical and production men involved, so that no time or effort was spared in the development. However, in spite of all this concerted push, the proposed device proved to be a complete failure.

It is hard to say whether this dismal result was due to the backwardness or the hide-bound nature of the cows involved, or to the fact that the mats tried were too hard and unyielding to provide an adequate cushion. At any rate, the rubber mattresses flopped ingloriously. Now, a quarter of a century later, we read that on one English farm, at least, the 1959 version of a rubber mat has been eminently successful. The mattress in this case was made up of a sheet (or sheets) of Polyurethane foam, approximately 5½ feet by 3½ feet in size and tapering in thickness from 3 inches to 1½ inches, enclosed in an envelope of polyvinyl chloride.

The Oxfordshire cows not only take to their downy-soft beds with unconcealed delight, but they also show their gratitude in a most practical way, by presenting their owner with a daily milk yield which is almost three times as great as the national average, which would seem to prove that pampering pays. Wonder what would happen if Muzak, or some other soft, soothing music, were introduced into these cows' barns? If the combination of soft beds and dreamy music did not result in a complete breakdown of the will to produce milk, it just might boost the milk production to another all-time high. Who will be the first to make this scientific test? Step up, farmers and future farmers of America.



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OVERSEAS AGENTS THROUGHOUT THE WORLD

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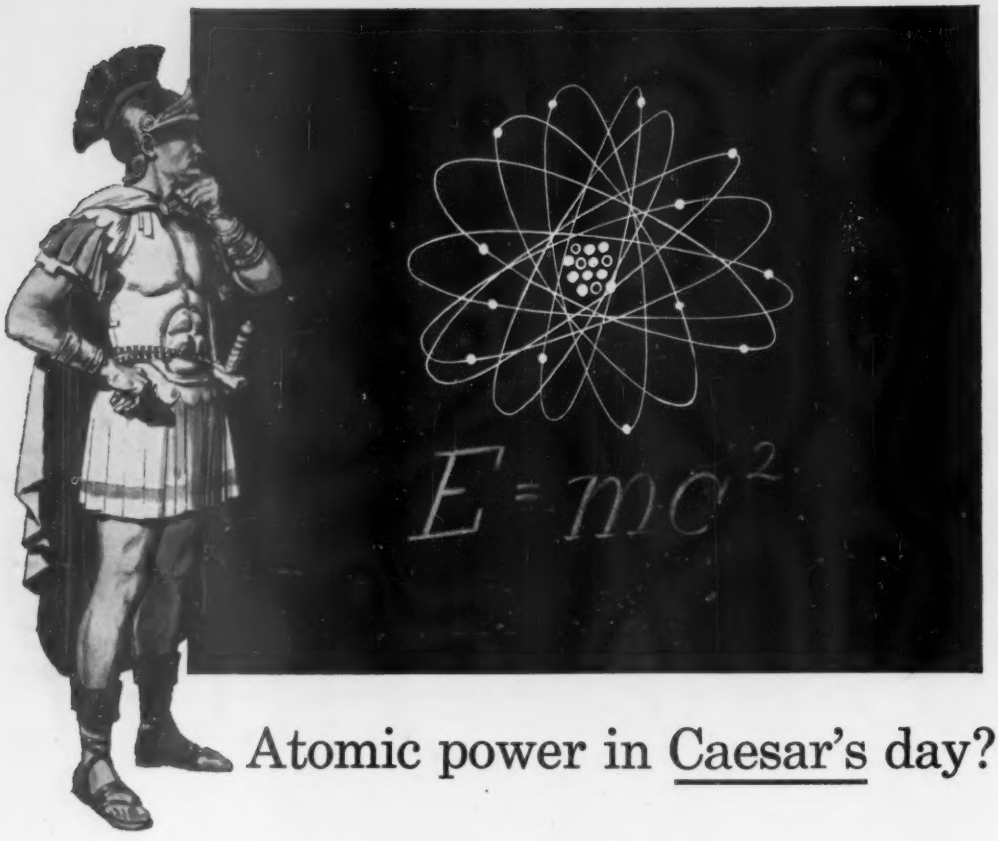

Atomic power in Caesar's day?

Certainly!

It was there, in the ground, in the air and water. It always had been. There are no more "raw materials" today than there were when Rome ruled the world.

The only thing new is knowledge . . . knowledge of how to get at and rearrange raw materials. Every invention of modern times was "available" to Rameses, Caesar, Charlemagne.

In this sense, then, we have available *today* in existing raw materials the inventions that can make our lives longer, happier, and inconceivably easier. We need only *knowledge* to bring them into reality.

Could there possibly be a better argument for the strengthening of our *sources* of knowledge—our colleges and universities? Can we possibly deny that the welfare, progress—indeed the very *fate*—of our nation depends on the quality of knowledge generated and transmitted by these institutions of higher learning?

It is almost unbelievable that a society such as ours, which has profited so vastly from an accelerated accumulation of knowledge, should allow anything to threaten the wellsprings of our learning.

Yet this is the case

The crisis that confronts our colleges today threatens to weaken seriously their ability to produce the kind of graduates who can assimilate and carry forward our rich heritage of learning.

The crisis is composed of several elements: a salary scale that is driving away from teaching the kind of mind *most qualified* to teach; overcrowded classrooms; and a mounting pressure for enrollment that will *double* by 1967.

In a very real sense our personal and national progress depends on our colleges. They *must* have our aid.

Help the colleges or universities of your choice. Help them plan for stronger faculties and expansion. The returns will be greater than you think.

If you want to know what the college crisis means to you, write for a free booklet to: HIGHER EDUCATION, Box 36, Times Square Station, New York 36, New York.

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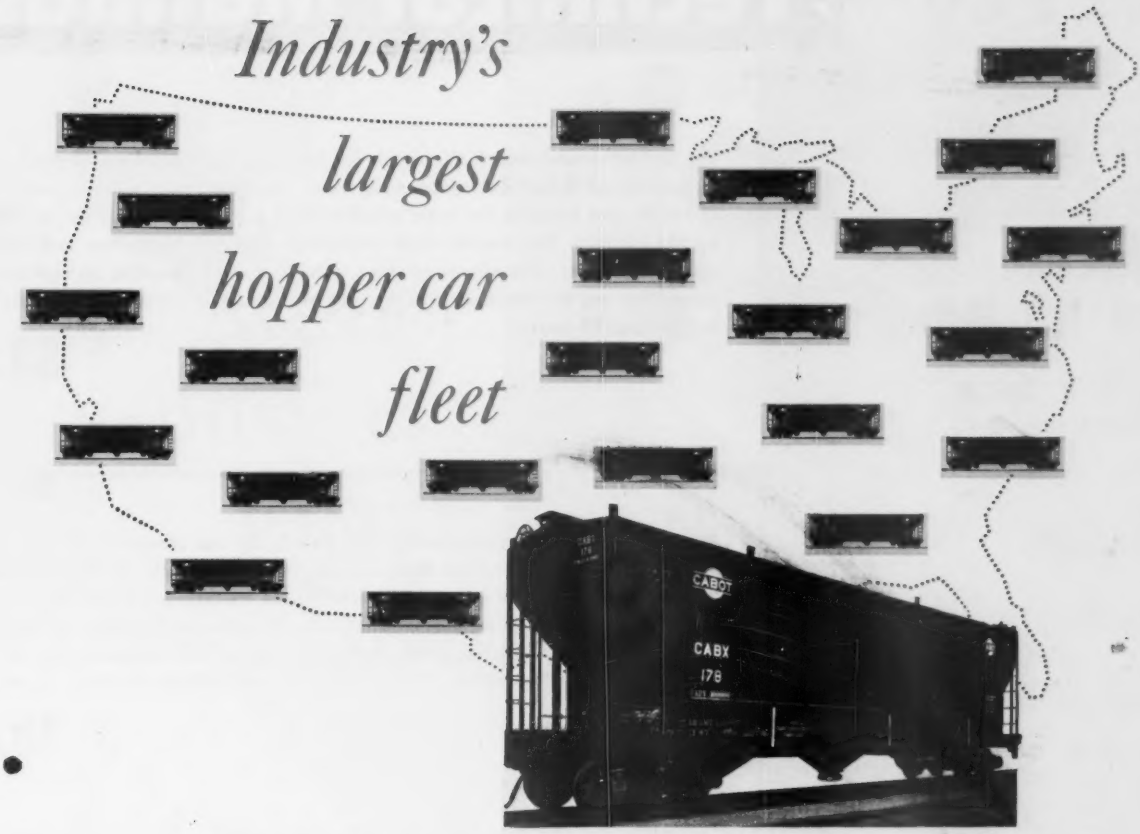

means better service for Cabot customers

Cabot's fleet of special hopper cars for delivering bulk shipments of carbon black will soon total 221. Put all these cars end to end and you'd have a train over 2 miles long — with a capacity of some 22 million pounds!

It's the largest fleet of its kind on rails — and *the* big reason why Cabot offers the industry's fastest, most dependable service of bulk shipments.

More and more carbon black users are taking advantage of the "bulk shipment" idea . . . an idea that started with Cabot, by the way . . . with all the benefits it offers in the way of price, cleanliness, efficiency and lower handling costs. The reason: handling techniques are so advanced today that even small-volume users can't afford not to.

If you'd like to know more about bulk handling, our engineering staff stands ready to make its long experience available to you without charge. *Just write:*

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R. A. B. R. M.

Technical Manuals

Conductive Rubber: Its Production, Application and Test Methods

by R. H. Norman

(RABRM Manual No. 1)

The first of several technical manuals produced by staff members of the Research Association of British Rubber Manufacturers, this publication surveys a whole mass of results and presents the main conclusions in a form which can be readily used by the industry. The manual deals extensively with the conductive and antistatic classes of rubber. The effects of stress, time and other variables on resistivity are covered as are test methods and the uses of conductive rubber. A complete index is provided. 99 pages.

$3.50

Ebonite: Its Nature, Properties and Compounding

by J. R. Scott

(RABRM Manual No. 2)

A mine of basic information which will enable the manufacturer of hard rubber (ebonite) to provide products that will give the best possible service. It gives the results of investigations into the dependence of mechanical, electrical and other properties on composition, vulcanization, etc. It covers such subjects as improving the resistance to "plastic yield" and reducing surface deterioration in light. Resistance to swelling action of organic liquids and solvents is also discussed. 294 pages.

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Analysis of Rubber and Rubber-Like Polymers

by W. C. Wake

(RABRM Manual No. 3)

The first modern work devoted solely to this important subject to be published in the English language. In addition to an analysis of natural and synthetic rubbers, the author deals with polyethylene, PVC, PVDC, PVA and the polyurethanes. Also discussed are the identification of compounding ingredients used in these polymers. This thorough and useful work will unquestionably become a standard and is a must for all interested in the analysis of rubber and rubber-like polymers. 250 pages.

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What doesn't our aniline have that makes it so good?

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So if you want clear, colorless, nearly dry, high-purity aniline shipped by tank car or tank wagon from Moundsville, West Virginia, on 24-hour notice, specify NATIONAL® aniline. You pay no premium for our extra-high quality and extra-fast service.

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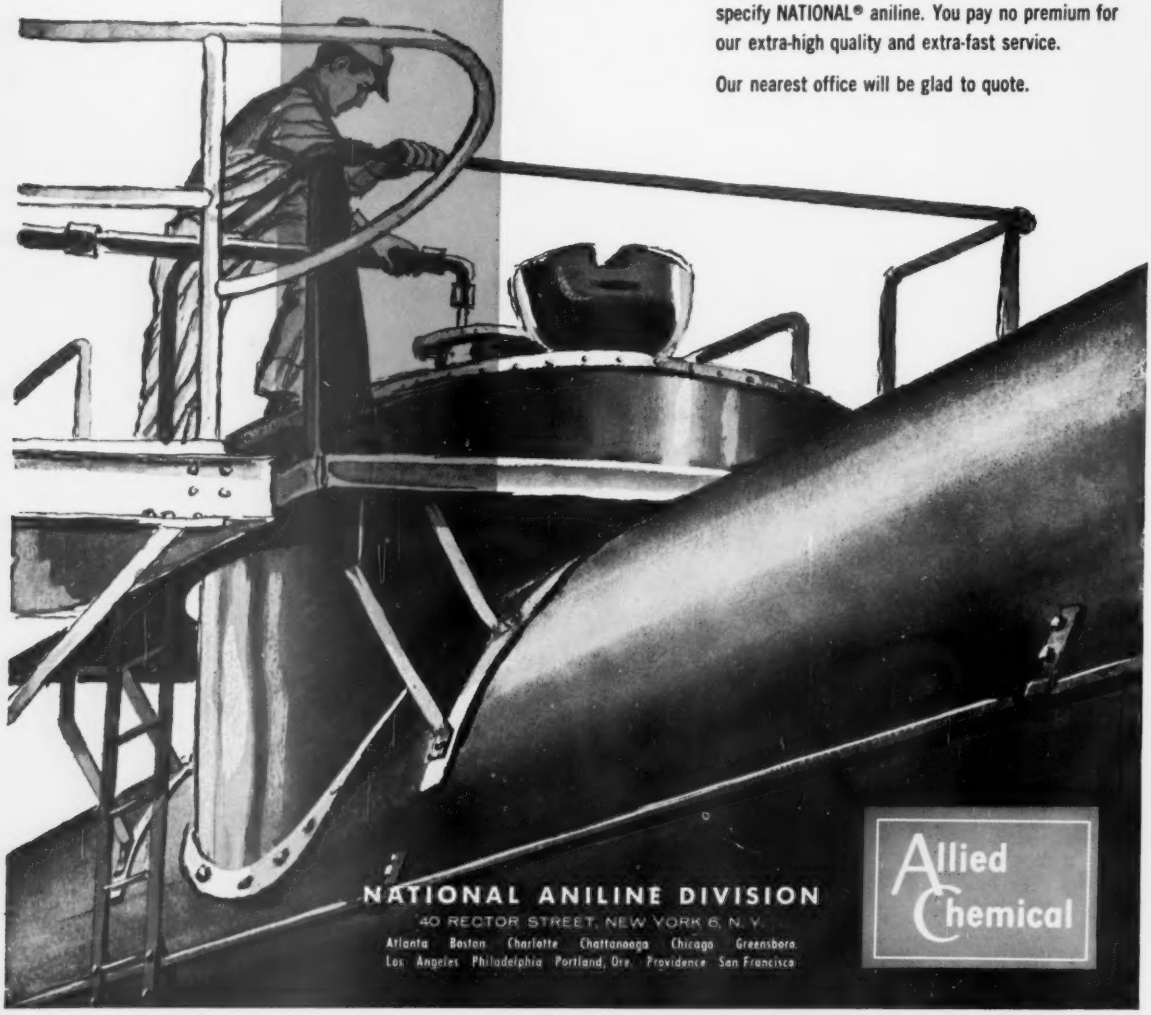

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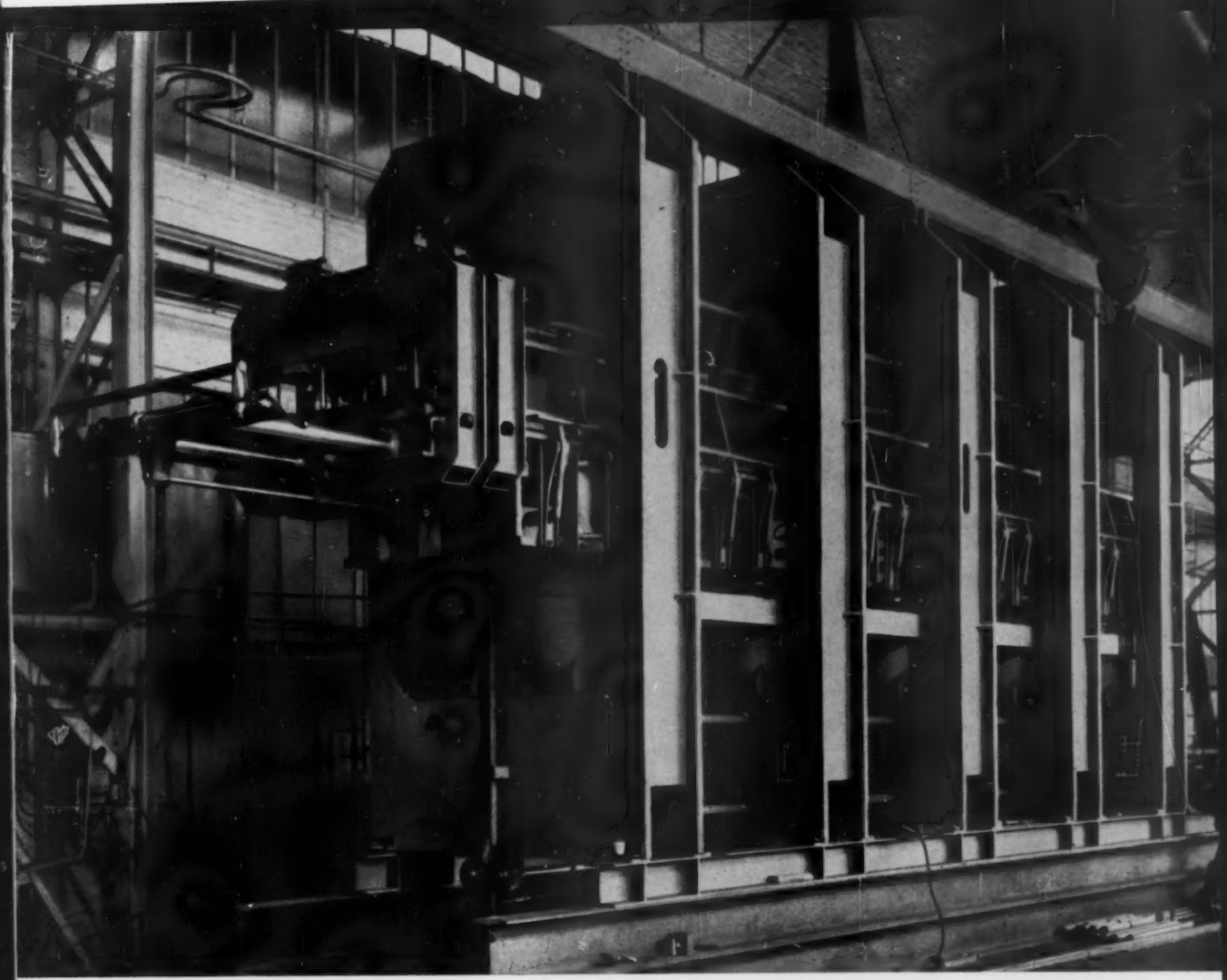

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with STAN-TONE colors for plastics or rubbers

Almost is not good enough. Working with hundreds of standard Stan-Tone pigments, Harwick laboratory men mix test batch after test batch until they arrive at an ***exact match*** . . . in hue, intensity and value.

This conscientious color control is followed through from formula mix to shipping container. Shipment after shipment, you receive color which is carefully matched to your original sample . . . and has uniform working qualities.

Pigments are selected for their brilliant masstones and for compatibility. Heat and light stability and high resistance to migration, crocking, bleed and other compounding problems are built right into the color materials. The Harwick man has full data on behavior of specific pigments in organasols, plastisols, PVC, polyethylene and rubber.

Stan-Tone colors are available dry, dispersed in plasticizer, in polyester resin or in polyethylene, and in masterbatch in rubber elastomer.

- **STAN-TONE** *Dry Colors Organic and Inorganic*
- **STAN-TONE** *PEC Polyester (Paste)*
- **STAN-TONE** *PC Paste (In Plasticizer)*
- **STAN-TONE** *MBS Masterbatch*
- **STAN-TONE** *GPE (Polyethylene)*

WRITE for Technical Data on STAN-TONE Colors . . . .

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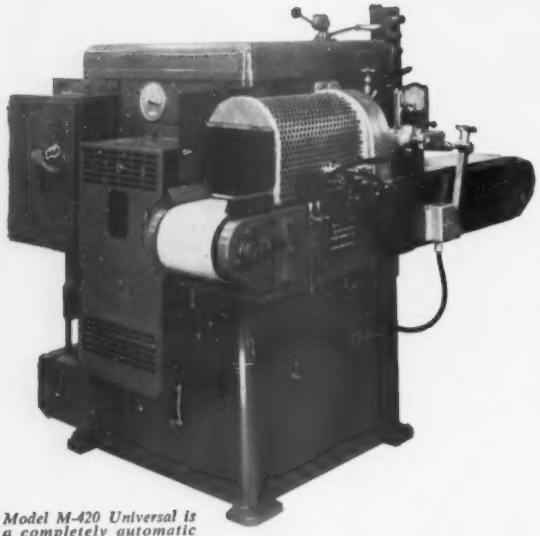
Typical rubber part molded from preps cut automatically by Wink Cutter at Monarch RubberCo., Hartsville, Ohio.

"Wink Cutter saves us 50 manhours a day."...Monarch Rubber Company automates cutting of mold preps; eliminates double handling; speeds operations



Model M-420 Universal is a completely automatic machine for both continuous and intermittent cutting. Pays off on short or big runs. The built-in metering conveyor elements transport the uncut stock to the knives, precisely measure the length of cut and move the cut stock away from the blades. Wink actually measures while it cuts from four points simultaneously. It does not depend upon timing or synchronization with another unit or machine—does not cut against a dead element but against another live knife.

New—Large cutter handles up to 6-inch diameters. Write for information.

"The Wink Cutter has really paid off for us in cutting mold preps", reports Monarch Rubber Company, producers of a wide range of molded rubber products. "By automatically cutting mold preps right at the extruder, at rates up to 1500 pieces a minute, we're saving 50 manhours a day." In this operation, the extruded material was formerly cut into long strips, transported to a guillotine cutter, unloaded, and cut at much slower rates.

Accuracy of the Wink Cutter also saves money for Monarch. The Wink unit cuts each piece within a fraction of an ounce. By holding weight of each piece so closely, flashing in the mold is reduced, minimizing waste material. "It's the most accurate machine we've run across", reports Monarch, "and this is important in big production runs."

Wink Cutters *can help you* reduce costs in cutting rubber, both raw and cured, plastics, impregnated fabrics, reinforced hose, natural and synthetic fibers, ceramics, candy . . . even sticky or viscous materials. Write today for Bulletin W-100 . . . it lists complete engineering information. Contact Motch & Merryweather Machinery Company, Wink Cutter Division, 1250 East 222nd Street, Cleveland 17, Ohio.

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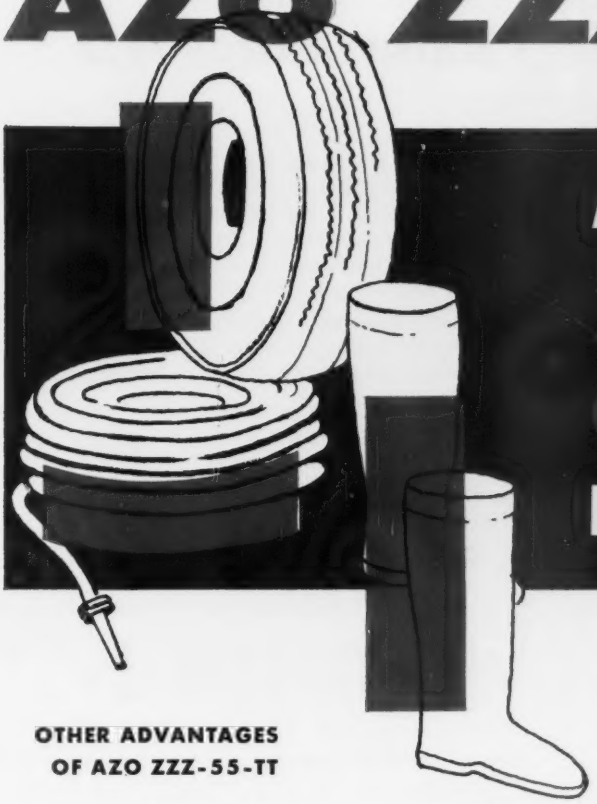
AZO ZZZ-55-TT



A Treated ZINC OXIDE For Use in Rubber

OTHER ADVANTAGES OF AZO ZZZ-55-TT

Faster curing

Safe processing

Improved scorch resistance

Lower acidity

High apparent density

Low moisture absorption

High tensile strength

Increased resistance to tear

Increased resistance to aging

NOTE:
AZO rubber grade zinc oxides are also available as AZODOX (de-aerated). AZODOX has twice the apparent density, half the dry bulk.

AZO ZZZ-55-TT is heat treated in a controlled atmosphere that removes objectionable trace elements and enhances mixing and dispersion. In addition, it is treated chemically to improve mixing and dispersion properties to an even greater degree.

AZO ZZZ-55-TT is a general purpose, smooth processing zinc oxide. We can highly recommend it to users who desire a treated zinc oxide. May we suggest that you try it in your most exacting recipes. Samples on request.

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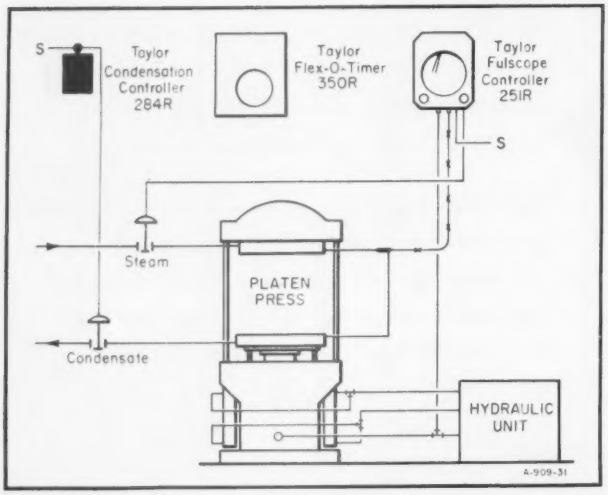
Left hand selector knob regulates duration of condensate valve opening. Adjustable from 2 to 13 seconds. Right hand knob controls a time cycle interval—1 minute, 2 minutes, or continuous. Power switch is located at upper left.

- **SIMPLE DESIGN**
- **EASY TO ADJUST**
- **MAINTENANCE FREE**

The new 284RJ Blow-Down Timer is a single function repeating cycle timer. It is designed to regulate a pneumatic control valve or other air operated device for two to thirteen seconds, once every one or two minutes. The pneumatic device may also be operated continuously.

This versatile instrument can be adapted to many applications, including removal of condensate from press platens and the operation of continuous boiler blow-down systems.

Announcing the **NEW** Taylor **BLOW-DOWN TIMER !**



A typical application for the new Blow-Down Timer—maintaining uniform temperature on a Platen Press by periodic purging.

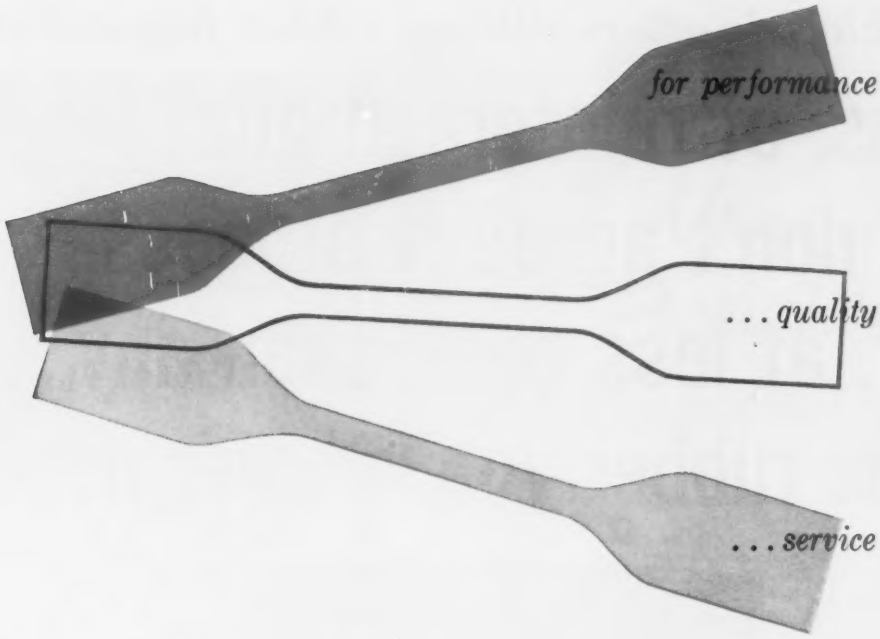
Mounted in a J.I.C. approved gasketed dirt tight case, it has a large capacity (3/16″ orifice) solenoid valve capable of 90 psi operation, rigidly mounted outside the case; electrical connections are gasketed. Power supply cable enters the case through a compression grommet.

Timing is accomplished by motor driven rotary wiper arms which contact commutator bars to energize a 6-volt circuit. A relay actuates the solenoid air valve which admits air to the control valve.

All basic component parts such as the timing motor, solenoid valve, transformer, relay, etc., can be removed through plug-in socket arrangements or tapered pin plug-in terminal connections. Commutator circuits are kept clean by the continuous wiping action of the rotary contact arms. For additional insurance the commutator circuits are enclosed in plastic.

For more information call your Taylor Field Engineer, or write for Sales **Bulletin No. 98351.** Taylor Instrument Companies, Rochester, N. Y.; Toronto, Ont.

Taylor Instruments **MEAN ACCURACY FIRST**



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Technical Service. Pennsalt's modern rubber laboratory . . . staffed by skilled, experienced rubber chemists and compounders . . . is available to help you evaluate formulas, solve compounding problems.

Physical and chemical data, performance studies, evaluation samples of Pennsalt rubber chemicals are yours on request. A note or phone call will bring them to you quickly. Industrial Chemicals Division, PENNSALT CHEMICALS CORPORATION, Three Penn Center, Philadelphia 2, Pa.

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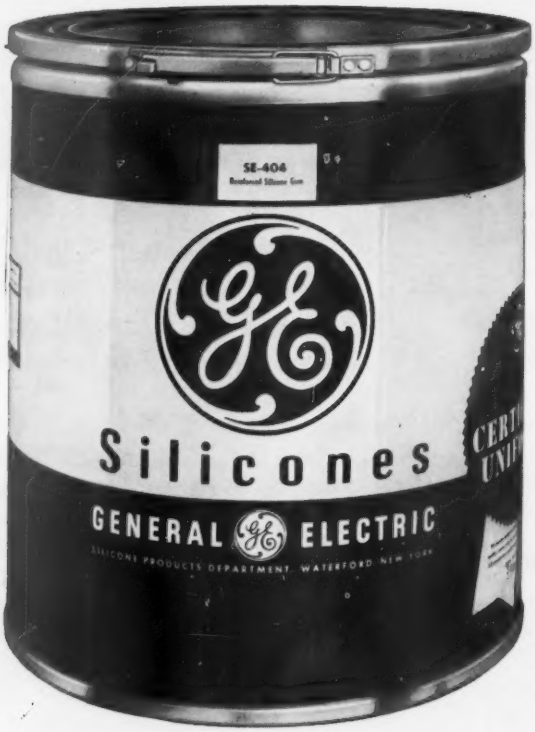
ESTABLISHED 1850

General Electric offers silicone rubber fabricators:

100 lbs. of reinforced gum free – if you don't agree it processes easier, at less cost, than any silicone rubber you've ever used!



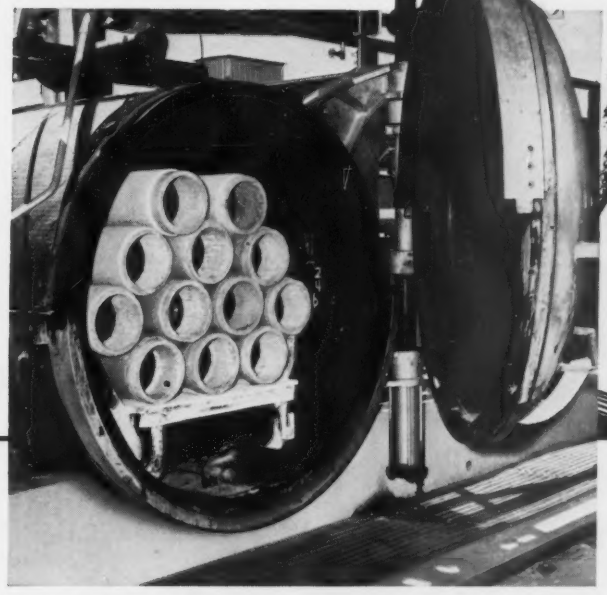
General Electric Reinforced Gums, like all G-E Silicone gums, are certified uniform — batch after batch after batch.

Here's all you do: Order a 100-lb. drum of General Electric's new SE-404 reinforced silicone gum and try it in your own plant. We won't bill you until the end of 90 days. If you are not completely satisfied that this is more economical and easier to process than any silicone rubber gum or compound you have ever used, write and tell us why and we will tear up the bill. You have absolutely nothing to lose! For full details about this unusual offer,* ask your G-E Silicone Sales representative.

Greater flexibility, lower costs, higher profits! By compounding with the new General Electric reinforced gums, you can meet your customers' specifications exactly and economically. The "gum approach" means you add more value to the product through your own operations... earn added profits and prestige for yourself as a custom compounder. You are also able to turn out a wider variety of products at sharply reduced cost. Add to this the savings from simplified inventory and ordering procedures and you'll see why it pays to "roll your own" with G-E silicone gums! **This offer expires Dec. 31, 1959.*

GENERAL ELECTRIC

Silicone Products Department, Waterford, N. Y.

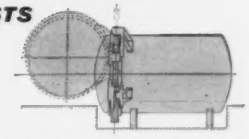


Memo to Production Engineers

◀ Adamson 90" dia. Hi-Lift Swing Door installed at Johns-Manville Products Corporation, Manville, N. J. One of many Adamson doors now in operation, or on order, for use in steam-curing TRANSITE® Pipe at J-M Plants in the U. S. and Canada.

Here are 6 important reasons why you should specify ADAMSON UNITED Hi-Lift Swing Vulcanizer & Autoclave Doors

1 LOWER INSTALLATION AND OPERATING COSTS



Adamson's lift-swing feature eliminates need for extended pit and expensive bridging. For example, on a 90" dia. door you can use an easily-handled loading bridge as short as 22".

2 TIGHT, LEAKPROOF SEAL

Adamson's special heat-resistant, self-sealing gasket utilizes vessel's internal pressure to assure a positive, leakproof seal.

3 EFFICIENT SLIDE-LOCK DESIGN

Provides virtually 360° of locking surface between door and mating shell ring. *Twice* the locking area of conventional breech-lock doors!

4 SAFE, RELIABLE OPERATION

Equipped with automatic door locking pins. Can be furnished with optional steam interlock controls for complete safety. Other built-in safety features included.

5 STRONGER CONSTRUCTION

Conventional castings are replaced by sturdy pressed steel head welded to continuous roll forged locking rings.

6 FAST OPENING AND CLOSING

Quick-unlocking, vertical-lift action powered by hydraulic cylinder. Door swings easily on anti-friction and bronze sleeve bearings. Simple, trouble-free operation.

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Subsidiary of United Engineering and Foundry Company
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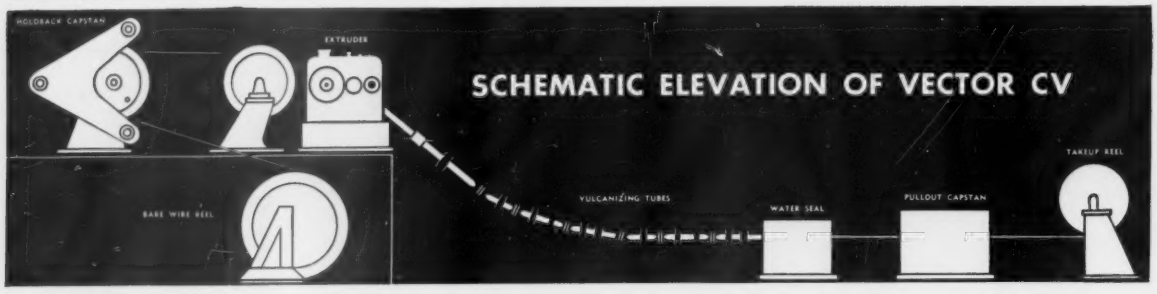

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VECTOR CV with special new double seal combines the advantages of horizontal and vertical CV without the disadvantages of either. Check these important features:

- **QUALITY**—wire and cable is completely supported externally to prevent scuffing and distortion.
- **SPEED**—full cycle of vulcanizing and pressure cooling assures production speeds commonly associated with horizontal CV.
- **VERSATILITY**—Positive support and full length of vulcanizing tubes assures economical production of a wide range of cable.
- **ECONOMY**—Easily installed without extensive—and expensive—plant alterations.
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NEW: **- "CONSTANT PRESSURE" ROLLER HOPPER**

Closer diameter control • Improved product density • Increased production • Labor saving

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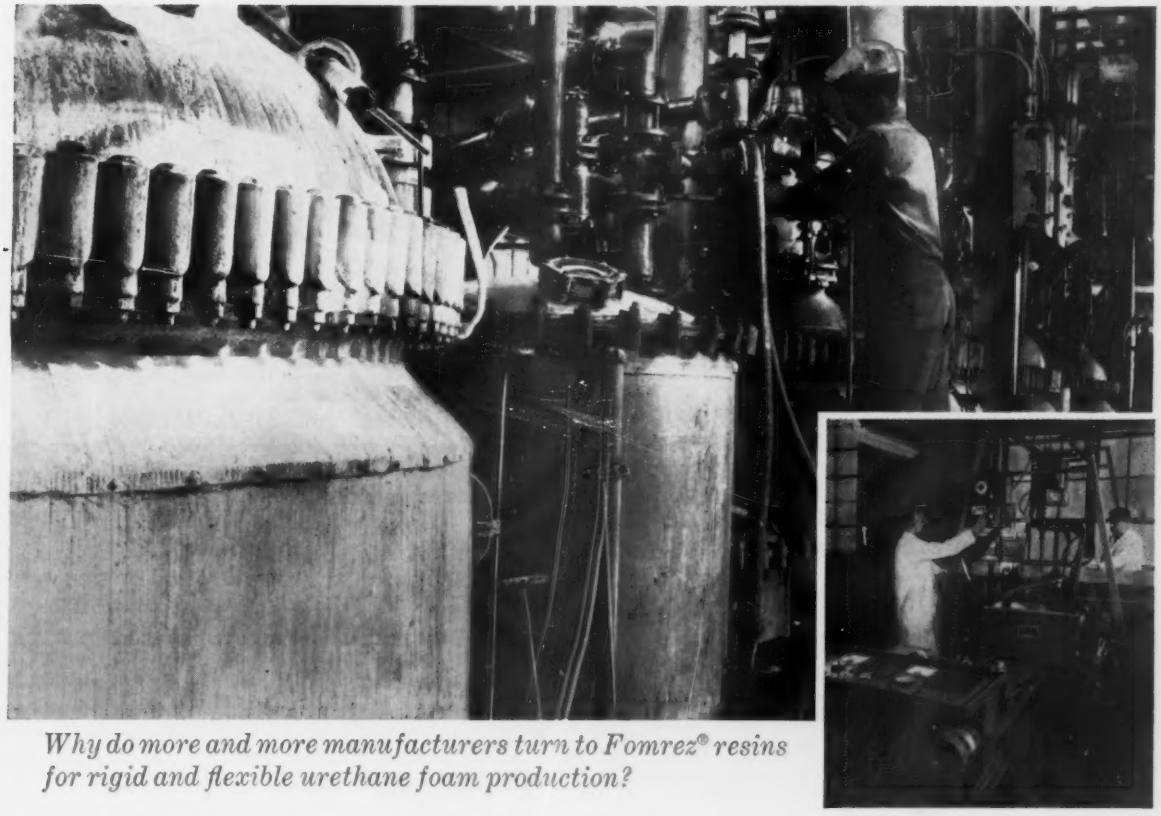
Witco Plant Controls Bring You The Most Uniform

RESINS FOR URETHANE FOAMS



Why do more and more manufacturers turn to Fomrez® resins for rigid and flexible urethane foam production?

Because WITCO FOMREZ resins assure batch-to-batch uniformity of your foam production. Their easy handling characteristics and high reproducibility reduce your production budget.

There's no compromise on quality with Witco. Up-to-date instrumentation guards high manufacturing standards. Quality is controlled at every production stage.

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FOR FLEXIBLE FOAMS: *Fomrez 50 and Fomrez 70* • For use in furniture cushioning and upholstering; automotive seating, crash pads and headliners; garment interliners and shoulder pads.

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I am interested in: ☐ Fomrez 50 and Fomrez 70 for flexible foams
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Please send ☐ literature ☐ sample. The application I have in mind is_____

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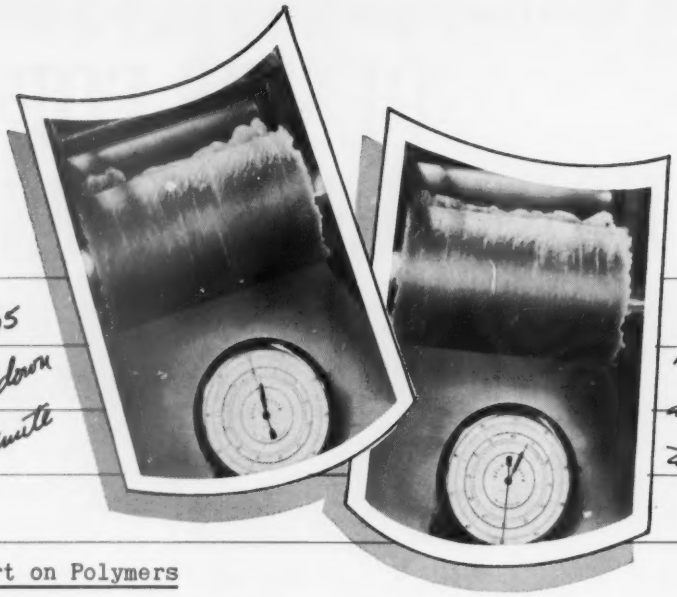

Report on Polymers

ASRC POLYMER 3105 ELIMINATES
BREAKDOWN STEP IN PROCESSING

Photographs above show how ASRC 3105 gives head start over competitive polymer 1502 in processing. Rubber and fillers can be introduced simultaneously without breakdown time before mix — with considerable savings in processing time and reduced power costs.

ASRC also offers additional advantages --

1. Absorbs 20-30% more fillers
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• Columbian Carbon Co. has announced that the company will build a $6,000,000 plant in northern Italy, near Milan, for the production of over 60 million pounds of carbon black annually, which will supply the European Common Market. The new plant, to operate under the name Columbian Carbon Europa, will be in full production by 1961.

• Discussing carbon black structures and tear resistance of vulcanizates, B. A. Dogadkin states that tear resistance can be increased by introducing active fillers into the mixtures as outlined in the January edition of the leading Russian trade paper, *Kauchuk i Rezina*. The author, who investigated the effect of the properties of various carbon blacks on tear resistance at different temperatures, suggests that active carbon black increases tear resistance.

Tear resistance was defined according to GOST 20-41, on a dynamometer at 20, 40, 70, 100 and 120°C. Samples of vulcanizates based on natural and butadiene-styrene rubber SKS-30 with a plasticity of 0.50, according to Karrer, and sodium butadiene rubber containing 20, 40, 60, and 100 per cent by weight of various types of carbon black (channel, anthracene, acetylene, gas, etc.) were tested.

The composition of rubber samples, which were vulcanized in a hydraulic press at 143°C., was given. The influence of the quantity of various carbon blacks on the tear resistance of the rubbers was shown, as well as the dependence of tear resistance on the process temperature for rubbers containing 60 per cent weight of different carbon blacks. Rubbers containing 20 to 100 per cent weight of carbon black showed a marked decrease in tear resistance when temperature was increased. This decrease was slightly lower when 40, 60, or 80 per cent weight of carbon black was added.

The coefficient of thermal stability for SKB and SKS-30 rubbers containing different dosages of carbon black were tabulated. The author suggested that increase in the tear resistance of the vulcanizates is due to the formation of secondary carbon black structures and is particularly noticeable when using channel, anthracene and acetylene black. These secondary carbon black structures cause an increase in the tear resistance at higher temperatures.

• An association known as Transalpine has been established in Bavaria to study possible construction of an oil pipeline across the Alps into Bavaria. Members of the group are leading representatives of economy, economic sciences and the Bavarian State. The study group will examine market conditions for oil in Bavaria, that is, market organization, readiness of the market to absorb various oil products, and possibilities of developing petrochemicals.

• The governments of the Federation of Malaya and Singapore have announced that they will permit direct importation of all commodities from the United States. Previous licensing regulations required special licenses for all goods which were permitted direct import from the dollar area. These have been changed so that goods from the dollar area may be imported under the same conditions as those from Western Europe. Most goods may now be imported into Malaya under open general license. Dollar exchange is freely obtainable by Malayan importers for all goods from the United States.

This liberalization has obviated the necessity to take a detour via Hong Kong to import many goods into Malaya from the United States. Previously, American exporters detoured in order to import into Malaya those goods which were not eligible for direct shipment. However, this increased costs by five to seven per cent. Now, based upon the new regulation, the United States is able to compete in the Malayan market on equal terms with non-dollar areas.

• A modern Portuguese tire plant, a joint enterprise of the Firestone Tire & Rubber Co. and a Portuguese corporation made up of industrialists and financiers, will go on stream in December. To be situated at Alcochete, an industrial town ten miles from Lisbon, the new plant will cover 93 acres. Construction began on January 23 following months of negotiations with the Portuguese government.

With 400 employes, the Firestone plant will have a production capacity of over 100,000 units a year. It plans to manufacture a full line of passenger and truck tires. The new plant, like the Firestone factories in Switzerland, Spain and Sweden, will leave controlling interest in the hands of a national corporation. Two other European plants, located in England and Germany, are controlled by Firestone.

• Several government publications feel compelled to remind American exporters to mark containers of goods which are shipped abroad with "United States

On the Continent (cont'd)

of America". Added to this admonition is the Senate Concurrent Resolution No. 40 which was adopted on July 30, 1953, and which suggests that such marking will help to publicize American made goods overseas. It would help a great deal if those words would be emphasized by an American flag and French, Spanish and German translations of the words "United States of America". The size of the letters is very important. They should be legible at a great distance.

A few weeks ago, during a European trip, the writer stood at the docks in Hamburg watching the unloading of several merchant ships. It was heartwarming to see that some of the larger boxes hoisted from the hold of a ship bore the inscription "Another Shipment from the Friendly United States of America, the Defender and Torchbearer of Democracy."

• Semperit, the Austrian-American rubber works corporation in Vienna, increased its production and sales during 1958. Approximately 33,000 tons of rubber goods of all kinds were manufactured, 10 per cent more than last year. Sales amounted to 1,160 million schillings (approximately $45,000,000) and more than 15 per cent of total production has been exported to various countries. Prices have not been increased because, although wages had to be adjusted, it was possible to absorb the higher production cost by greater efficiency in manufacturing methods.

Net profit after taxes amounted to approximately $700,000 and the dividend has been increased from eight per cent to nine per cent. In 1959, Semperit looks forward to a year of excellent results. The national economy is booming in Austria and based upon the first six months of this year, it can be assumed that domestic sales will establish a record and that export figures will top those of last year.

• A tire factory will be built in Roumania soon. The British industrial concern, Rustyfa has received an order to deliver machinery and equipment for this projected factory from Roumanian authorities. The order amounts to approximately $25 million and the factory is supposed to produce 1,000,000 tires for trucks, buses and automobiles; 500,000 tires for motorcycles and scooters; and 1,500,000 tires for bicycles annually. These figures will cover the domestic requirements and when the new factory goes on stream, imports will no longer be necessary.

• In the Indian bicycle industry, there are now 24 large factories for the manufacture of complete bicycles. India also has about 78 shops, scattered all over the territory, which operate on a very small scale. Production of bicycles has been progressively increasing during the last few years. In 1953, there were six factories which turned out 264,169 bicycles per year. In 1958, there were 20 factories producing approximately 1,000,000 bicycles annually. Now, the capacity of all factories combined amounts to about 1,500,000 bicycles per year. The government is trying to improve the efficiency of the operating factories in order to make it possible to produce bicycles at a lower cost.

Gradually, due to the shortage of foreign exchange, imports of bicycles into India have been curtailed. The government has also investigated whether the Indian bicycle industry will be able to export its production in order to earn foreign exchange. It was found that there is ample opportunity for selling Indian bicycles to a number of neighboring countries like Afghanistan, Burma, East Africa, Egypt, Nepal and others, provided that certain difficulties which now hamper exports are removed. At present, competitors in those markets are Great Britain and Japan which, of course, are able to quote lower prices.

• Walter Blum, an electronic dealer of Zurich, Switzerland, pleaded guilty and was fined $1,500 by the United States District Court of the Eastern District of New York for attempting to smuggle highly strategic electronic equipment out of the United States. He was apprehended on July 16 at Idlewild Airport by Bureau of Foreign Commerce export control investigators and United States Customs officials as he was preparing to depart for Zurich.

The electronic equipment, valued at $7,500 and including miniature silicon rectifiers, silicon cartridge rectifiers and crystal diodes, was found concealed in Blum's personal baggage by government agents and was seized by Customs. Officials of the Bureau of Foreign Commerce said the sensitive equipment is under strict security export control and requires individual validated license for shipment outside the United States.

• A few months ago, *Boletin Del Instituto Espanol Del Caucho* (Bulletin of the Spanish Institute of Rubber) began to run a series consisting of definitions of all technical terms utilized in the rubber industry in four languages including English, French, Spanish and German. Each issue contains about 70 different technical expressions with their respective translations. Copies of the Spanish bulletin may be obtained by writing to *Boletin Del Instituto Espanol Del Caucho,* Londres, 94 bis, Barcelona, Spain.

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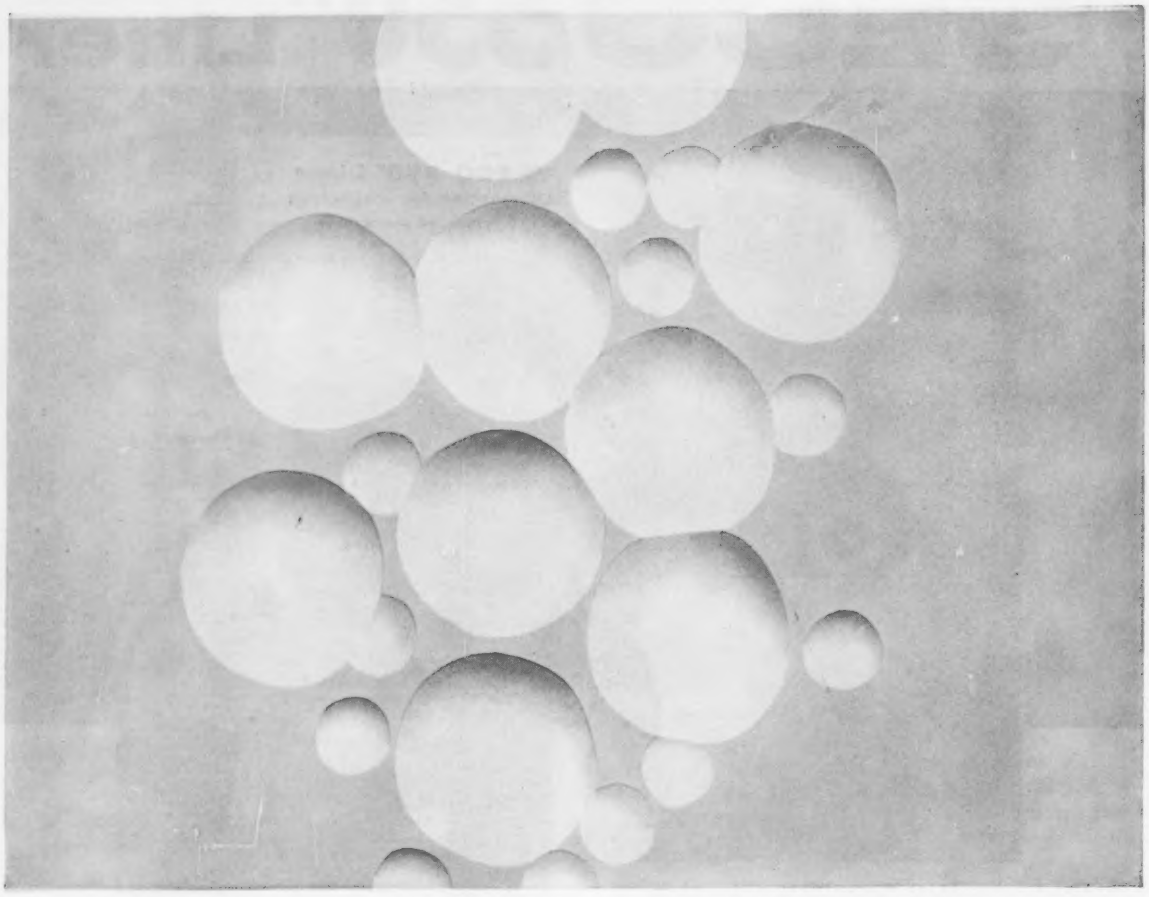

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Elastomers for Use in Radiation Fields

PART V: Effect of Gamma Radiation on Nitrile Elastomers

with data on supplemental elastomers and flexible plastics

By ROBERT HARRINGTON

Hanford Laboratories Operation, General Electric Co., Richland, Wash.

THE PREVIOUS articles in this series have presented background information on the subject of radiation damage to organic polymers, outlined the method of measuring physical property changes, presented some sections concerning some basic considerations, have shown how gamma radiation affects the physical properties of many masses of elastomers as well as materials within a class, and also have included some data on a few flexible rubberlike plastics *(1-4)*.

This article departs from a strict presentation of data comparing various types of elastomers and plastics by being, in part, concerned with specific variables within a given class of rubbers. Specifically, data and discussion are given concerning the effect carbon black loading and acrylonitrile content have on the changes induced in the physical properties of acrylonitrile-butadiene copolymers. To a lesser extent, the studies provide information on the effect of cure system, antioxidant, and plasticizer. Due to the many variables involved, no attempt has been made to be all inclusive, but rather to present the data in the hope that it will be useful from the standpoint of engineering information as well as help contribute to the better understanding of how compounding ingredients affect the radiation induced changes in base polymeric substances.

The effect of gamma radiation on elastomers and plastics is given in the second section of this article in order to help keep the reader abreast of the latest information on the subject. A major portion of the data presented here is supplemental to the previous articles. However, one new elastomer class is included, the Adduct rubbers, and three new plastics materials: fluorocarbon, formaldehyde, and urethane types.

NITRILE ELASTOMERS

The nitrile elastomer materials used in the studies reported here are listed in Table I, which gives the recipes and cure schedules. Other nitrile elastomers included here for discussion purposes have been described previously *(3)*.

Experimental Procedure and Results

All materials were exposed to gamma radiation and evaluated by recording changes in physical properties as described previously *(1)*. For all irradiations up to and including 1×10^8 r, a Cobalt-60 isotope source at Hanford was used. For the higher irradiations, spent fuel elements of the Materials Testing Reactor (MTR), Idaho Falls, Idaho were used. This latter source was used for the longer exposures because the higher dose rates obtainable at the MTR very signifigantly reduced the amount of irradiation time. The results obtained from the irradiation of the same materials to the same dose from both sources agree

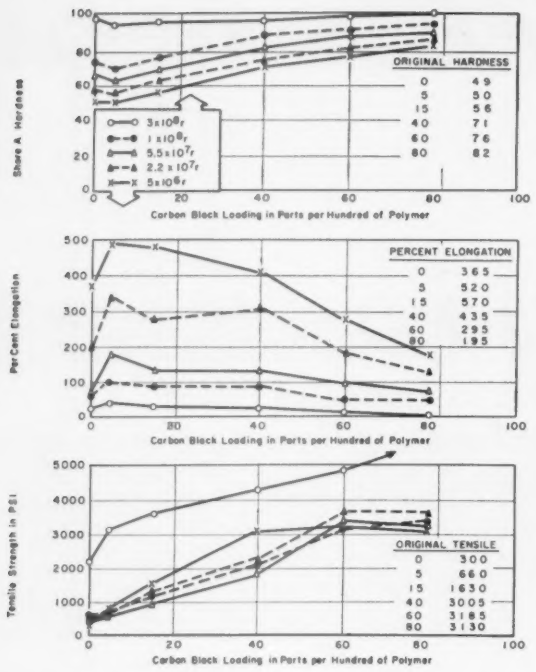

FIG. 1—Effect of carbon black loading on the gamma radiation-induced changes in the physical properties of nitrile elastomers.

closely enough so that it can be assumed that the experimental results obtained are independent of the two sources *(1)*.

The data obtained from exposing the nitrile elastomers listed in Table I to various doses of gamma radiation in air at 25°C. at normal atmospheric pressure are presented in Table II. This table shows original property values opposite zero irradiation dose followed by per cent property changes resulting from the various gamma radiation doses. Also shown opposite zero irradiation dose and under the remarks column is the original color of each material. Significant color changes and other observations needing comment are also noted in this column opposite the particular radiation dose causing the phenomena.

Discussion

The data presented in Table II and in a previous article *(3)* show that at low and intermediate exposures the hardness and tensile strength of the nitrile elastomers vary considerably, but on prolonged exposures to high doses all of the materials become hard and brittle and exhibit great increases in tensile strength. The varying nature of the tensile and hardness changes at the low and intermediate doses is apparently a function of the acrylonitrile content of the polymer and also of the manner in which the polymer is compounded. These variables regulate the amount of competing processes which are occurring within the elastomer as a result of exposure to ionizing radiation. They may accomplish this, for example, by allowing cross-linking to predominate over chain cleavage or oxidation at a given dose. The tensile strength reflects the effect of these variables to a greater extent than hardness while elongation, because it is lowered in all cases as the radiation dose is increased, is not particularly informative in these studies.

In respect to the application of radiation effects data it may sometimes be necessary to determine which is the more pertinent, the actual value change, or the per cent property change (property loss or retention). For example, which of the following elastomers would be the best to use in a radiation field

TABLE I—RECIPES OF NITRILE ELASTOMERS USED FOR GAMMA IRRADIATION STUDIES

	Hanford Experimental Materials -HW-							B. F. Goodrich Chemical Co. Hycar 1002						
Recipe Materials	B17	B18	B19	B20	B21	B22	B23	B-1	B-2	B-3	B-4	B-5	B-6	Hycar Geon
Hycar 100x88	100.0	—	—	—	—	—	100.0	—	—	—	—	—	—	—
Hycar 1002	—	100.0	—	—	—	—	—	100.0	100.0	100.0	100.0	100.0	100.0	—
Hycar 1072	—	—	100.0	—	—	—	—	—	—	—	—	—	—	—
Hycar 1042	—	—	—	—	—	100.0	—	—	—	—	—	—	—	—
Hycar 1014	—	—	—	100.0	100.0	—	—	—	—	—	—	—	—	—
Hycar 1043	—	—	—	—	—	—	—	—	—	—	—	—	—	70.0
Geon 126	—	—	—	—	—	—	—	—	—	—	—	—	—	30.0
Zinc Oxide	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	5.0	3.0
TMTD	3.5	3.5	3.5	3.5	3.0	3.0	3.0	3.5	3.5	3.5	3.5	3.5	—	3.0
Stearic Acid	1.0	1.0	1.0	1.0	—	—	—	1.0	1.0	1.0	1.0	1.0	1.0	1.0
TMTM	—	—	—	—	—	—	—	—	—	—	—	—	.4	—
Santocure	—	—	—	—	3.0	3.0	3.0	—	—	—	—	—	—	—
Sulfur	—	—	—	—	.3	.3	.3	—	—	—	—	—	—	1.5
FEF Black	—	—	—	—	—	—	—	5.0	15.0	40.0	60.0	80.0	60.0	20.0
GPF Black	—	—	—	—	60.0	60.0	60.0	—	—	—	—	—	—	—
MT Black	—	—	—	—	—	—	—	—	—	—	—	—	—	30.0
Antimony Trioxide	—	—	—	—	—	—	—	—	—	—	—	—	—	5.0
Tricresyl Phosphate	—	—	—	—	—	—	—	—	—	—	—	—	—	20.0
Triton X-100	—	—	—	—	—	—	—	—	—	—	—	—	20.0	—
AgeRite Resin D	—	—	—	—	3.0	3.0	3.0	—	—	—	—	—	—	—

All compounds cured 30 minutes at 310°F. except HW-B21, 22, 23 which were cured 12 minutes at 300°F.

TABLE II—EFFECT OF GAMMA RADIATION ON THE PROPERTIES OF NITRILE ELASTOMERS

Materials	Dose ($r \times 10^{-6}$)	Initial Properties and Per Cent Change: Hardness Shore A; Δ%	Elongation %; Δ%	Tensile psi; Δ%	Remarks
HW-B17	0	51	585	535	Grey-tan
	5	3.9	— 21.4	— 5.6	
	22	15.7	— 52.1	7.7	b
	55	31.4	— 72.6	61.9	c
	100	54.9	— 88.3	139.8	d
	300	96.1	— 99.1	972.0	e, a
HW-B18	0	49	365	300	Grey-tan
	5	4.1	1.4	22.5	
	22	18.4	— 45.2	22.8	b
	55	36.7	— 80.8	20.9	c
	100	51.0	— 83.6	90.1	d
	300	100.0	— 94.5	644.0	e, a
HW-B19	0	61	460	885	Brown-grey
	5	0.0	1.1	9.4	
	22	8.2	— 20.7	35.6	c
	55	23.0	— 55.4	103.5	d
	100	50.8	— 78.3	175.7	f
	300	63.9	—100.0	762.2	f, a
HW-B20	0	45	290	310	Brown-tan
	5	6.7	— 27.6	— 4.8	
	22	13.3	— 27.6	2.3	g
	55	28.9	— 51.7	11.0	g
	100	51.1	— 79.3	13.9	g
	300	115.6	— 91.4	511.6	e, a
HW-B21	0	76	310	2640	Black
	5	— 1.3	— 5.9	9.5	
	10	1.3	— 12.3	6.5	
	50	10.5	— 43.2	9.0	
	100	15.8	— 69.2	7.4	h
	300	27.6	— 93.8	*	a
	500	31.6	— 97.7	*	a
HW-B22	0	79	305	2940	Black
	5	0.0	— 8.2	— 1.7	
	10	1.3	— 4.9	2.1	
	50	7.6	— 37.7	11.9	
	100	13.9	— 67.2	13.9	
	300	24.1	— 91.8	*	a
HW-B23	0	85	305	2590	Black
	5	2.4	— 14.6	2.4	
	10	3.5	— 24.3	4.1	
	50	11.8	— 60.5	20.3	
	100	16.5	— 80.3	*	
	300	17.7	—100.0	*	a
Hycar 1002 B-1	0	50	520	660	Black
	5	2.0	— 5.8	11.4	
	22	12.0	— 34.6	2.0	
	55	26.0	— 65.4	— 7.3	
	100	42.0	— 80.8	7.1	
	300	92.0	— 92.3	374.0	a
Hycar 1002 B-2	0	56	570	1630	Black
	5	1.8	— 14.9	— 3.1	
	22	12.5	— 50.9	—25.4	
	55	25.0	— 76.3	—39.5	
	100	37.5	— 84.2	—29.7	
	300	75.0	— 94.7	121.9	a
Hycar 1002 B-3	0	71	435	3005	Black
	5	1.4	— 5.7	— 1.6	
	22	5.6	— 29.9	—29.1	
	55	15.5	— 69.0	—38.9	
	100	25.4	— 79.3	—30.0	
	300	38.0	— 93.1	43.1	a
Hycar 1002 B-4	0	76	295	3185	Black
	5	1.3	— 8.5	0.4	
	22	7.9	— 37.3	14.2	
	55	15.8	— 66.1	9.0	
	100	19.7	— 83.1	— 2.1	
	300	30.3	— 96.6	51.4	a
Hycar B-5	0	82	195	3130	Black
	5	1.2	— 7.7	— 0.8	
	22	6.1	— 33.3	16.1	
	55	9.8	— 64.1	2.3	
	100	14.6	— 74.4	7.4	a
	300	22.0	—100.0	109.8	a
Hycar B-6	0	67	290	2985	Black
	5	3.0	— 3.4	10.0	
	22	13.4	— 44.8	2.0	
	55	20.2	— 69.0	4.3	
	100	32.8	— 82.8	— 0.7	
	300	49.3	— 98.3	86.9	a
Hycar 1043 Geon	0	74	635	1415	Black
	5	1.4	— 13.4	17.8	
	22	9.5	— 63.0	35.5	
	55	23.0	— 85.8	79.1	
	100	32.4	— 92.1	106.5	
	300	35.0	—100.0	391.7	a

*Exceeded capacity of tensile tester; tensile strength greater than 4000 psi. Another tester was used for the other materials.
Remarks: a = broke when bent 180 degrees; b = slightly olive; c = light olive drab; d = olive drab; e = brown; f = darker olive drab; g = slightly darker; h = stress cracks first appeared.

to any arbitrary exposure if the data obtained for this exposure were as follows:

Elastomer	Original Tensile Strength	Per Cent Change of Tensile Strength	Actual Tensile Strength
A	1000 psi	— 20.0	800 psi
B	2000 psi	— 60.0	800 psi
C	5000 psi	— 70.0	1500 psi
D	6000 psi	— 80.0	1200 psi

Based upon per cent loss of property, compound A would be selected as it apparently has not been affected to a great degree because it has retained much of its original value. Based upon the actual or final value compound C would be favored as it is of greater magnitude than the others. It should be noted, however, that this material probably has undergone more change with respect to its chemical structure as evidenced by the rather large per cent change. The choice between compounds A and C would then depend on the particular application and whether or not the original values were actually required, whether or not a great change in the material could be tolerated, and lastly on whether or not the final value was most important. The other compounds listed above could represent possible compromises.

Effect of Carbon Black

To study the effect of carbon black loading on the radiation induced changes in nitrile rubbers, Hycar 1002 was selected as representative of polymers in this class. Compounds HW-B18 and Hycar 1002 B-1

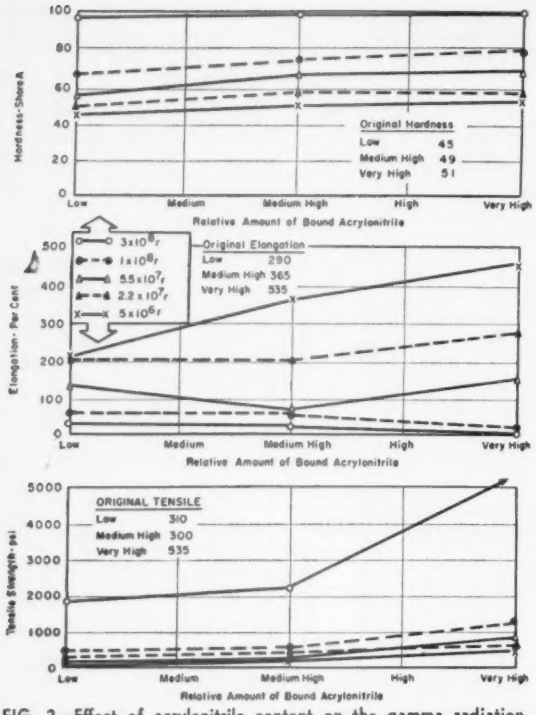

FIG. 2—Effect of acrylonitrile content on the gamma radiation-induced changes in the physical properties of nitrile elastomers.

through B-5 containing varying amounts of carbon black were used for these studies. With the exception of the carbon black the amounts of all other compounding ingredients were the same and were based upon B. F. Goodrich Chemical Co.'s standard test recipe number two. Graphic illustrations showing how the hardness, elongation and tensile strength are affected as a function of filler loading after being exposed to gamma radiation are shown in Figure 1, which was constructed from the data given in Table II.

The property which is most drastically affected by varying the amount of carbon black is the tensile strength. The gum stock without carbon black, HW-B18, increased in tensile strength at the low exposures, remained fairly constant at the intermediate doses, and after a dose of about 6 x 10^7 r the tensile increased at a high rate. As the carbon black content is increased, the tensile strength is lowered at the low and intermediate doses before assuming a great increase. This holds true out to a loading of forty parts where the tensile strength reached a minimum with respect to percentage loss of this property before increasing. At the higher loadings of sixty and eighty parts the tensile strength is increased slightly at the low doses, decreased at the intermediate doses and then assumes the typical increase. On the basis of per cent increase in tensile strength at the dose of 3 x 10^8 r, the gum stock is increased more than the others with the five, fifteen, eighty, sixty, and forty part carbon black compounds following in that order.

The behavior of the tensile strength, going through maximum and minimum values as a function of carbon black loading after exposure to ionizing radiation, is similar to the trend in original values of tensile strength. Here the tensile strength does not simply increase with increased carbon black loading.

The hardness of the nitrile elastomers appears to be a function of the amount of carbon black with the exception of the gum stock and the compound with five parts carbon black. Although the gum stock was slightly softer before irradiation, it was affected to a greater degree than was the other material. At all exposures except 3 x 10^8 r, the gum stock was slightly harder than the five part carbon black compound. With this exception, the harder materials remained harder during the irradiations with the softer materials showing a greater per cent change. It should also be noted that the actual hardness of all the materials was approaching the same value at the highest dose examined. This is in agreement with work *(2)* reported on silicone elastomers which showed that all materials in a filler loading series will approach the same degree of hardness even though there was a great spread in their original hardness.

The elongation of the materials, like the tensile strength, does not exhibit a definite trend with respect to carbon black loading. With the exception of the gum stock, the elongation of the materials at 5 x 10^6 r and at 3 x 10^8 r does appear to be a function of the carbon black loading—the less amount of carbon black the greater the elongation. However, between these doses a great deal of overlapping occurred particularly with respect to the 15 part carbon black material. This may be in some manner associated with the fact that this material had the highest original elongation. Otherwise, it appears in general that the materials with less carbon black possess more elongation at any of the exposures studied. The gum stock behaved somewhat similarly to the 60 part material.

The brittleness of the materials appears to be a function of the carbon black loading—the less carbon black, the more flexible the material at any given exposure. The gum stock was about equal to the five part carbon black material.

In general, the data on the effect of carbon black loading on radiation induced changes in the physical properties of a typical nitrile elastomer show that several factors must be taken into consideration for the practical application of these materials in radiation fields. For example, the original properties, per cent change, actual change, and radiation exposure must all be taken into consideration. The carbon black loading may give the material desirable original properties for an application but the change or damage to these properties for a particular radiation exposure may make it mandatory to use another loading amount. The selection of these materials could also depend upon the desirability of designing around one or more properties which are held to minimum changes at the expense of other properties.

Effect of Acrylonitrile Content

Two series of materials were used to study the effect of the acrylonitrile content on the radiation induced changes in the physical properties of nitrile elastomers. The first series (HW-B17, 18, and 20) represent stocks without carbon black, while the second series (HW-B21, 22, and 23) represent the same nitrile polymers but compounded with carbon black with a different cure system. The polymers used represent very high (HW-B17 and HW-B23), medium high (HW-B18 and HW-B22), and low (HW-B20 and HW-B21) acrylonitrile contents. The gum stocks with minimum compounding ingredients were used to observe the effects of acrylonitrile content directly with minimum interference, while the other compounded materials with the carbon black loading were used to determine whether or not any effects of the acrylonitrile content were of sufficient magnitude so as not to be masked by the several compounding ingredients in these compounds. It should be noted here that several observations concerning the effect of the acrylonitrile content have been made previously *(3)*.

For all of the properties examined the changes induced by radiation appear to be a direct function of the acrylonitrile content to the extent that predictions can be made within the practical limits of acrylonitrile content. How the acrylonitrile content affects the radiation induced changes in the physical properties of nitrile elastomers is graphically shown in Figure 2 which is constructed from the data presented in Table II on compounds HW-B17, 18, and 20. Figure 3 also shows the effect of acrylonitrile content but on the basis of per cent change in properties rather than absolute values.

Considering the absolute values of tensile strength as shown in Figure 2, it can be seen that as the acrylonitrile content is increased the tensile strength is increased to a greater extent by exposure to radiation, the rate of increase being greater as the exposures are increased. There is some overlapping at the intermediate doses between the low and medium high acrylonitrile materials. Figure 3 demonstrates that as the acrylonitrile content is increased the per cent change in the tensile strength shows a very marked increase in the rate of change as the exposures are increased. This is also confirmed from the data presented on compounds HW-B21, 22, and 23 and on the materials discussed in a previous report *(3)*. These materials reflect different directions and magnitudes of change due to cure system and carbon black loading, but nevertheless the effect of the acrylonitrile content is not completely masked.

The acrylonitrile content apparently does not have a significant effect on the hardness increases caused by exposure to ionizing radiation. All materials increased in hardness as the exposures increased with the softer materials showing a greater increase, which, as discussed above, is a typical trend for hardness.

The elongation of the materials exhibits an interesting trend with respect to acrylonitrile content. At

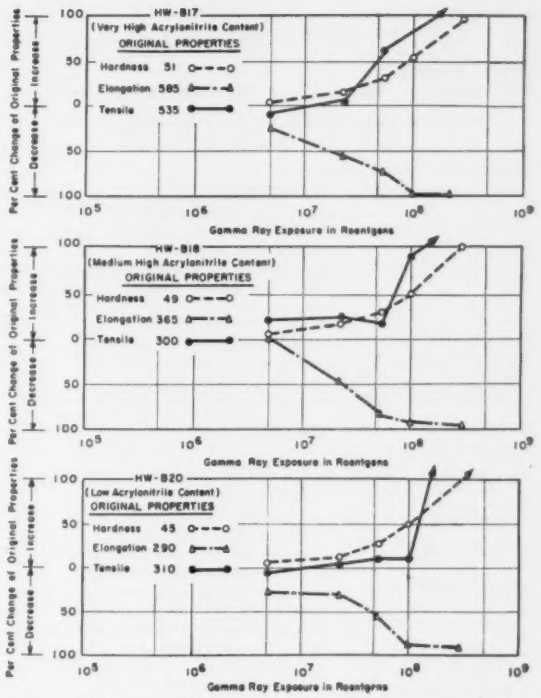

FIG. 3—Effect of acrylonitrile content on the gamma radiation-induced percentage changes in the physical properties of nitrile elastomers.

the low doses the materials possess more elongation in order of increasing acrylonitrile content. At the intermediate doses the trend gradually reverses until, at the highest dose examined, the retention of elongation was in order of decreasing acrylonitrile content.

Based upon work with the three gum stocks, the materials appear to remain slightly more flexible as the acrylonitrile content is decreased.

Cure System and Other Considerations

Because of the many variables involved, little work was done on the effect of the cure system on the radiation induced changes in the physical properties of the nitrile elastomers. However, a comparison of compounds HW-B17, 18, and 20 (gum stocks) with HW-B23, 22, and 21 (loaded stocks with different cure and stabilizing systems) shows that the ingredients in these latter materials have more of a stabilizing effect on the tensile strength. As the radiation exposures are increased the tensile strength increases at a rate considerably slower than the former series of materials. This could possibly be in part due to the stabilizing system which has been shown previously *(3)* to act in a similar manner with Hycar AR which contained a stabilizing anti-rad.

The tensile strength of Hycar 1072 which contains carboxylic groups in the polymer chain is affected in a different manner than its counterpart Hycar 1042 containing no carboxylic groups *(3)*. These materials were compounded in the same manner including car-

TABLE III—SUPPLEMENTAL ELASTOMERS AND PLASTICS USED FOR GAMMA IRRADIATION STUDIES

Material Supplier and Designation	Type or Description (Post Cure)
SUPPLEMENTAL ELASTOMERS	
ADDUCT RUBBERS	
Goodyear Tire and Rubber Co.	
R24 X 916*	An 86% saturated methyl mercaptan adduct of polybutadiene.
R24 X 931*	A 92% saturated methyl mercaptan adduct of polybutadiene.
R24 X 944*	A 65% saturated methyl mercaptan adduct of a 67/33 butadiene/acrylonitrile copolymer.
CHLOROSULFONATED POLYETHYLENE RUBBERS	
DuPont Elastomer Chemicals Dept.	
Hypalon A2109D-8*	Hypalon 20 polymer used.
Hypalon A2109D-9*	Hypalon 20 polymer used.
FLUOROELASTOMERS	
DuPont Elastomer Chemicals Dept.	
Viton A-12*	A copolymer of vinylidene fluoride and hexafluoropropylene.
Viton A-13*	A copolymer of vinylidene fluoride and hexafluoropropylene.
Viton A-14*	A copolymer of vinylidene fluoride and hexafluoropropylene.
Viton A-15*	A copolymer of vinylidene fluoride and hexafluoropropylene.
Viton A-16*	A copolymer of vinylidene fluoride and hexafluoropropylene.
Viton A-17*	A copolymer of vinylidene fluoride and hexafluoropropylene.
Viton A-18*	A copolymer of vinylidene fluoride and hexafluoropropylene.
Hooker Electrochemical Co.	
Hooker HA-1	Designated by manufacturer as hexafluoropentylene adipate.
Hooker HA-2	Designated by manufacturer as hexafluorpentylene adipate; adipate .8 to isophthalate .2
SILICONE RUBBERS	
Dow Corning Corp.	
Silastic S2096	Methyl vinyl, ditertiary benzoyl peroxide cure (24/480).
Silastic S2097	Methyl vinyl, ditertiary benzoyl peroxide cure (24/480).
Silastic S2098	Methyl vinyl, ditertiary benzoyl peroxide cure (24/480).
Silastic S2071 B-2	Methyl vinyl, dichlorobenzoyl peroxide cure (24/480).
Silastic S2081	Methyl vinyl, ditertiary benzoyl peroxide cure (24/480).
Silastic S2201 B-1	Dimethyl (no post cure).
Silastic S2201 B-2	Dimethyl (24/480).
General Electric Co.	
SE-452	Methyl vinyl (24/480).
SE-472	Methyl vinyl (24/480).
SE-482	Methyl vinyl (24/480).
SE-100	Dimethyl (24/480).
81813	Dimethyl (16/25; room temperature vulcanized material).
SE-701	Methyl phenyl (24/480).
SE-555R	Methyl phenyl vinyl containing small amount of red iron oxide filler (3/400).
81821R	Methyl phenyl vinyl (3/400).
81821G	Methyl phenyl vinyl (4/400).
Union Carbide Corp.	
K-1057	Methyl vinyl (24/480).
K-1605R	Methyl vinyl (24/480).
K-1605GR	Methyl vinyl coated on regular weave glass tape (24/480).
K-1605GB	Methyl vinyl coated on bias weave glass tape (24/480).
SUPPLEMENTAL PLASTICS	
FLUOROCARBON	
DuPont Film Department	
R-20 film	Polyvinyl fluoride.
R-22 film	Polyvinyl fluoride surface treated to promote adhesion of various coatings.
FORMALDEHYDE	
Westlake Plastics Co.	
Delrin	Polyformaldehyde (an acetal resin).
PROPYLENE	
Hercules Powder Co.	
Pro-Fax	Polypropylene.
URETHANE	
B. F. Goodrich Chemical Co.	
Estane VC	Polyurethane, natural color.
Estane VC Black	Polyurethane, colored with small percentage of carbon black.

* See Table V for recipes and cure schedules.

bon black loading. The tensile strength of the Hycar 1072 was increased with increasing radiation exposure while the Hycar 1042 was decreased in tensile strength at the intermediate exposures. Gum stocks from the same type polymers both exhibited large increases in tensile strength as the radiation exposure was increased, with the Hycar 1072 type increasing to a greater extent. It should be noted that Hycar 1002, which is similar to Hycar 1042, was used in the gum stock studies.

At the highest dose examined, 3 x 10^8 r, the carboxylic polymer was quite stiff and brittle and had lost its elongation, while the Hycar 1002 gum stock material had retained a small percentage of its elongation and was fairly flexible.

Hycar 1002 B-6, compounded for water resistance, and Hycar 1043 Geon, representative of a nitrile rubber-polyvinyl chloride blend, were included in these studies for information purposes only as they do not constitute a part of the other series of materials.

Summary

The work reported in this section of the article has shown in general the manner in which carbon black, acrylonitrile content, carboxylic groups, and to a lesser extent the cure and stabilizing system affect the radiation induced changes in the physical properties of nitrile elastomers. The accompanying box summarizes the effects of carbon black loading and acrylonitrile content with which the major portion of this section was concerned. The discussion has been general in nature and the reader is urged to make his own examinations for points not covered here, and also to refer to the previous article *(3)* in this series.

SUPPLEMENTAL ELASTOMERS AND PLASTICS

The materials reported in this section are listed in Table III. Recipes and cure schedules for the materials which are not proprietary items are given in Table IV. Table V presents the data obtained from exposing these materials, as described in the first section, to various doses of gamma radiation.

The data given in Table V show how gamma radiation affects the physical properties of several elastomers and plastics belonging to classes previously discussed in this series of articles as well as several new types of elastomers and plastics.

Elastomers

Adduct Rubbers. Three materials in this new class of elastomers *(5)* were evaluated for their resistance to the damaging effects of ionizing radiation. Two were methyl mercaptan adducts of polybutadiene with different saturations while the third material was a similar adduct of a nitrile polymer. All of these materials appear to be quite radiation resistant and can be grouped among the better elastomers in this respect. Lack of more compounds for study precluded an extensive evaluation of this class, and the following comments will necessarily be general in nature.

Materials R24 X 916 and R24 X 931, which essentially differ only in the amount of saturation, still possessed some strength and flexibility after being exposed to a gamma dose of 1 x 10^9 r, with the more highly saturated R24 X 931 showing slightly more resistance to radiation. Both materials were increased in hardness as the radiation exposure was increased while their elongation was decreased. The tensile strength, on the other hand, increased at the low and intermediate exposures before being decreased at the higher doses. The less saturated material, R24 X 916, exhibited a greater per cent increase in tensile strength which is attributed to more cross-linking in this material at the unsaturated sites. The tensile strength of the more highly saturated R24 X 931 was reduced considerably more at the higher doses. Figure 4 graphically illustrates the radiation induced changes in compound R24 X 931.

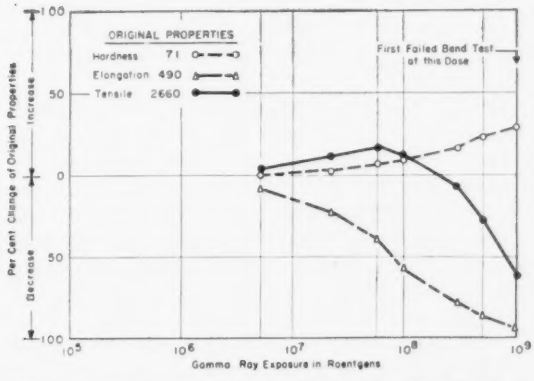

FIG. 4—Change in properties of adduct rubber R24 X 931 induced by exposure to gamma radiation in air at 25°C. and normal atmospheric pressure.

General Effects of Acrylonitrile Content and Carbon Black on the Radiation Resistance of Nitrile Elastomers

As acrylonitrile content increases, radiation-induced changes show:

Tensile strength is increased.

Elongation is retained at low doses and lost at high doses.

Hardness changes are unaffected.

Flexibility decreases.

As carbon black loading increases, radiation-induced changes show:

Tensile strength is lowered at intermediate radiation exposures to a carbon black loading of about forty parts, then is increased to intermediate and high doses.

Elongation decreases.

Hardness changes are unaffected.

Flexibility decreases.

The nitrile adduct, R24 X 944, behaved similarly to the "average" changes in the nitrile compounds HW-B3 and HW-B4 at the low and intermediate exposures. At the higher exposures the adduct did not show a tremendous increase in tensile strength which has been typical of all of the other nitrile elastomers. In fact, the tensile strength trend in the adduct was reversed, as the material continued to be lowered in tensile strength out to a dose of 1 x 10^9 r. This material is rated as being slightly poorer in radiation resistance as compared with the other two adducts.

Chlorosulfonated Polyethylene Rubbers. Two additional formulations of Hypalon chlorosulfonated polyethylene have been included here. Compound A21-09D-8 was cured with a litharge-magnesia system while compound A2109D-9 was cured with an epoxy system. The hardness of both materials was increased with increased exposure to radiation, while the elongation was lowered. The tensile strength of both materials was slightly increased at the low exposures before being decreased at the intermediate doses. At the higher exposures the tensile strength of the A2109D-8 material was increased to a great extent while the other compound continued to have its tensile strength reduced. This difference in tensile strength behavior is attributed in large part to the differences in cure. The A2109D-9 material was slightly more flexible at the highest dose studied.

Fluoroelastomers—Viton A. Seven compounds based upon Viton A polymer were examined. Lack

TABLE IV—RECIPES OF SUPPLEMENTAL ELASTOMERS USED FOR GAMMA IRRADIATION STUDIES

ADDUCT RUBBERS

Recipe Materials	R24 X 916	R24 X 931	R24 X 944
86% saturated methyl mercaptan adduct of polybutadiene	100.0	—	—
92% saturated methyl mercaptan adduct of polybutadiene	—	100.0	—
65% saturated methyl mercaptan adduct of 67/33 butadiene-acrylonitrile	—	—	100.0
HAF Black	50.0	50.0	50.0
Hydrated Lime	2.0	2.0	2.0
DiCup 40 C	5.0	7.0	4.5
Pine Tar	.5	—	—
Cure (min./°F.)	60/300	60/330	60/325

CHLOROSULFONATED POLYETHYLENES

Recipe Materials	A2109D-8	A2109D-9
Hypalon 20	100.0	100.00
Litharge	20.0	—
Magnesia	10.0	—
SRF Black	10.0	20.00
NBC	3.0	—
MBTS	.5	.50
Tetrone A	.5	1.50
Epon 828	—	15.00
DOTG	—	.25

Both compounds cured 30 minutes at 307°F.

FLUOROELASTOMERS

	Viton A			
Recipe Materials	12	13	14	15
Viton A	100.0	100.0	100.0	100.0
Zinc Oxide	10.0	10.0	10.0	10.0
Dyphos	10.0	10.0	10.0	10.0
Thermax	—	20.0	40.0	60.0
HMDA-Carbamate	1.0	1.0	1.0	1.0

	Viton A		
Recipe Materials	16	17	18
Viton A	100.00	100.0	100.00
Darlington 601 MgO	15.00	15.0	15.00
Thermax	20.00	20.0	20.00
HMDA-Carbamate	.75	1.0	1.25

All compounds cured 30 minutes at 300°F. and post cured 24 hours at 400°F.

Recipe Materials	HA-1	HA-2
Adipate	100.0	—
Adipate-isophthalate	—	100.0
SRF Black	50.0	50.0
Purecal U	20.0	20.0
DiCup 40C	19.0	19.0

Compounds cured 55 minutes at 320°F. and post cured 16 hours at 350°F.

of samples precluded studying these materials at more than one radiation exposure—1 x 10^8 r. The materials Viton A-12 through A-15 constitute a carbon black loading series from a gum stock with no carbon black up to a stock with sixty parts carbon black. These materials were all increased in hardness at the one exposure studied with the softer materials being increased at a greater rate. All were lowered in elongation on about the same percentage basis, but the materials with greater original values retained more actual elongation.

Irradiation to a dose of 1 x 10^8 r does not significantly change the tensile strength of either the Viton A material with no carbon black or with sixty parts, while the tensile strength of the intermediate loaded stock was considerably changed. As the original tensile strength values can also reach an optimum at several different carbon black loadings, the radiation-induced tensile strength behavior appears to be more closely correlated with the original values than with the amount of carbon black loading.

The three Viton A materials, A-16 through A-18, constitute a series where the HMDA-Carbamate curing ingredient is increased. It is interesting to note that while all the properties of these three materials were essentially the same after a radiation dose of 1 x 10^8 r, the per cent change in properties followed a definite pattern based upon the amount of HMDA-Carbamate with the exception of hardness which appeared to be unaffected. On the basis of per cent change, as the curing agent was increased more elongation was retained while the tensile strength was reduced. These three materials were slightly more flexible after being exposed to a dose of 1 x 10^8 r than were the four Vitons discussed above.

Fluoroelastomers—Polyesters. The two Hooker fluorinated polyester type elastomers are experimental materials and are representative of a new elastomer class. Because of the limited supply of these materials, they were studied using twenty mil thick sheets and ASTM D 412-51T Die D dumbbell tensile specimens. Out to an exposure of 3 x 10^8 r the materials were affected quite similarly. The hardness was increased while both elongation and tensile strength were reduced as the radiation exposure was increased. The tensile strength of the HA-2 material was not lowered as much as that of the HA-1. As the exposure was increased to 5 x 10^8 r, the tensile strength of both materials was increased with the HA-2 material exhibiting a large change as compared with the HA-1 compound. On the basis of flexibility after the 5 x 10^8 r exposure, the HA-1 material appeared to be in slightly better condition. Both of these two materials appear to be superior to other fluorine-containing elastomers which have been examined with respect to radiation resistance.

Silicone Rubbers—Dimethyl. All of the dimethyl silicone rubbers examined were increased in hardness and decreased in elongation as the radiation exposure was increased. The tensile strength did not follow a definite pattern in these materials. In the work reported previously *(2)* the tensile strength of these silicone elastomers was generally increased. Also, as previously reported, the dimethyl silicone rubbers appear in general to be less radiation resistant than the other types.

Silicone Rubbers—Methyl Vinyl. These rubbers behaved in much the same manner as the dimethyl materials—hardness increased and elongation decreased with increased exposure to radiation while the tensile strength followed less predictable trends.

Silicone Rubbers—Methyl Phenyl Vinyl. The high strength methyl phenyl vinyl silicone elastomers evaluated here were slightly superior in radiation resistance to the above two classes of silicones. They followed the same trend in physical property changes as did the other materials of this type previously reported *(2, 4)*. The hardness was increased with increased exposure to radiation while the tensile strength

TABLE V—EFFECT OF GAMMA RADIATION ON SUPPLEMENTAL ELASTOMERS AND PLASTICS

Materials	Dose ($r \times 10^{-6}$)	Initial Properties and Per Cent Change: Hardness Shore A; Δ%	%; Δ%	Tensile psi; Δ%	Remarks
ELASTOMERS					
ADDUCT RUBBERS					
R24 X 916	0	76	365	1990	Black
	5	0.0	— 6.8	11.3	
	22	2.6	— 21.9	36.0	
	55	7.9	— 47.9	41.5	
	100	16.5	— 60.3	36.2	
	300	17.1	— 86.3	12.0	
	500	21.1	— 89.0	—10.1	a
	1000	25.0	— 95.9	—14.3	
R24 X 931	0	71	490	2660	Black
	5	0.0	— 7.1	3.1	
	22	2.8	— 21.4	11.5	
	55	7.0	— 38.8	17.8	
	100	9.9	— 56.1	10.8	
	300	16.9	— 78.6	— 7.7	
	500	22.5	— 85.7	—27.3	
	1000	29.6	— 93.9	—60.7	a
R24 X 944	0	78	440	3170	Black
	5	0.0	— 11.4	10.4	
	22	3.8	— 44.3	19.1	
	55	7.7	— 70.5	— 0.1	
	100	11.5	— 79.5	—15.2	
	300	17.9	— 90.9	—24.6	
	500	21.8	— 93.2	—24.6	a
	1000	25.6	— 98.9	—26.1	a
CHLOROSULFONATED POLYETHYLENE RUBBERS					
Hypalon A2109D-8	0	60	410	1610	Black
	5	0.0	— 22.0	— 2.9	
	22	20.0	— 48.6	11.6	
	55	23.3	— 73.2	—29.0	
	100	36.7	— 85.4	—37.8	
	300	65.0	— 97.6	61.3	a
Hypalon A2109D-9	0	55	350	1980	Black
	5	7.3	— 25.7	6.6	
	22	20.0	— 48.6	11.6	
	55	32.7	— 62.9	7.3	
	100	38.2	— 71.4	—22.4	
	300	56.4	— 91.4	—44.9	a
FLUOROELASTOMERS					
Viton A-12	0	58	365	1245	Tan
	100	44.8	— 86.3	0.0	a, b
Viton A-13	0	67	340	2100	Black
	100	32.8	— 92.6	16.4	a, b
Viton A-14	0	75	260	1975	Black
	100	24.0	— 84.6	— 9.4	a, b
Viton A-15	0	84	200	1720	Black
	100	15.5	— 85.0	2.6	a, b
Viton A-16	0	67	800	1285	Black
	100	26.9	— 93.8	38.4	a, c
Viton A-17	0	68	420	1960	Black
	100	26.5	— 88.1	— 3.6	a, c
Viton A-18	0	69	325	2205	Black
	100	26.1	— 84.6	—19.9	a, c
Hooker HA-1	0	68	225	1830	Black
	5	2.9	— 15.6	—26.6	
	22	4.4	— 51.1	—55.8	
	55	14.7	— 68.9	—63.5	
	100	17.6	— 82.2	—64.7	
	300	29.4	— 93.3	—74.7	a
	500	39.7	— 95.6	—36.2	a
FLUOROELASTOMERS (CONT'D.)					
Hooker HA-2	0	80	110	1460	Black
	5	6.3	4.5	—11.2	
	22	7.5	— 18.2	—17.0	
	55	12.5	— 54.5	—35.0	
	100	13.8	— 77.3	—39.9	
	300	21.3	— 90.9	—43.7	a
	500	23.8	— 95.5	—64.1	a
DIMETHYL SILICONE RUBBERS					
Silastic S 2201 B-1	0	58	440	1025	White
	5	6.9	— 17.0	— 3.0	
	22	24.1	— 62.5	—22.9	d
	55	41.4	— 88.6	—22.3	a, e
	100	53.4	— 97.7	—11.0	a, e
	300	62.1	—100.	— 6.5	a, e
Silastic S2201 B-2	0	68	250	870	White
	5	4.4	— 18.0	0.7	
	22	16.2	— 60.0	7.2	d
	55	25.0	— 76.0	15.7	a, e
	100	30.9	— 96.0	10.3	a, e
	300	38.2	—100.	20.6	a, e
SE-100	0	43	115	170	White
	5	18.6	— 6.0	61.4	
	22	34.9	— 48.7	37.4	
	55	65.1	— 82.9	— 4.1	a
	100	83.7	— 95.7	7.6	a
	300	120.1	—100.	138.3	a
81813	0	71	95	925	Red
	5	2.8	— 37.5	—15.8	
	22	5.6	— 47.9	—15.4	
	55	12.7	— 68.8	—27.6	a
	100	21.1	— 74.0	—32.3	a
	300	33.8	—100.	—24.8	a
METHYL PHENYL SILICONE RUBBERS					
SE-701	0	59	95	570	Red
	5	6.8	— 33.0	—10.0	
	22	11.9	— 38.1	3.3	
	55	25.4	— 58.8	15.8	
	100	30.5	— 68.4	16.9	a
	300	64.4	—100.	52.8	a
METHYL VINYL SILICONE RUBBERS					
Silastic S2096	0	70	120	655	Red
	5	2.9	— 25.0	— 6.4	
	22	8.6	— 45.8	— 6.4	
	55	20.0	— 58.3	— 4.6	
	100	25.7	— 87.5	—13.1	a
	300	37.1	—100.	1.4	a
Silastic S2097	0	80	105	820	Red
	5	1.3	— 23.8	— 5.0	
	22	5.0	— 42.9	—12.4	
	55	11.3	— 71.4	4.6	a
	100	16.3	— 85.7	8.2	a
	300	22.5	—100.	11.7	a
Silastic S2098	0	87	90	825	Red
	5	1.2	— 16.7	12.2	
	22	3.5	— 33.3	24.9	
	55	6.9	— 66.7	28.7	a
	100	10.3	— 83.3	22.6	a
	300	13.8	—100.	22.0	a

Remarks: a=broke when bent 180 degrees; b=very slightly tacky; c=slightly tacky; d=very light grey; e=slightly darker grey; f=light blue-grey; g=darker blue-grey; h=hardness and elongation not applicable; i=peeled and chipped slightly when bent 180 degrees; j=hardness not applicable; k=light green-grey; l=darker green-grey; m=light yellow; n=light amber; o=bright yellow; p=dark amber; q=Shore D hardness used; r=slightly darker amber; s=oily on surface.

TABLE V—EFFECT OF GAMMA RADIATION ON SUPPLEMENTAL ELASTOMERS AND PLASTICS (CONT'D.)

Materials	Dose ($r \times 10^{-6}$)	Initial Properties and Per Cent Change: Hardness Shore A; Δ%	Elongation %; Δ%	Tensile psi; Δ%	Remarks
METHYL VINYL SILICONE RUBBERS (CONT'D.)					
Silastic S2071 B-2	0	55	265	880	Red
	5	14.6	— 33.7	3.5	
	22	29.6	— 58.3	— 6.0	
	55	47.3	— 81.1	—16.6	
	100	52.8	— 86.8	—23.5	a
	300	74.6	—100.	— 8.1	a
Silastic S2081	0	55	375	800	Red
	5	16.4	— 42.4	— 4.9	
	22	32.7	— 70.5	— 7.7	
	55	47.3	— 86.6	— 9.2	
	100	61.8	— 94.6	—21.4	a
	300	76.4	—100.	— 9.2	a
SE-975	0	73	215	910	White
	5	8.2	— 34.6	6.6	
	22	15.1	— 62.6	5.1	
	55	23.3	— 86.0	—12.6	a
	100	27.4	— 93.0	13.3	a
	300	34.3	—100.	28.7	a
SE-452	0	54	370	935	White
	5	9.3	— 21.6	6.8	
	22	27.8	— 66.2	—15.0	
	55	32.5	— 82.4	—29.1	
	100	61.1	— 91.9	—30.5	a
	300	72.2	—100.	—39.9	a
SE-472	0	75	200	875	White
	5	4.0	— 20.0	6.7	
	22	12.0	— 52.5	15.3	
	55	21.3	— 80.0	2.1	a
	100	24.0	— 85.0	—12.2	a
	300	29.3	—100.	— 4.1	a
SE-482	0	81	220	1025	White
	5	2.5	— 22.7	0.0	
	22	8.6	— 61.4	— 5.3	
	55	13.6	— 81.8	— 8.9	a
	100	17.3	— 90.9	—10.4	a
	300	21.0	—100.	—27.5	a
XK-1057	0	69	150	755	White
	5	7.2	— 20.0	2.9	f
	22	18.8	— 46.7	26.4	g
	55	29.0	— 66.7	45.3	a, g
	100	34.8	— 93.3	88.3	a, g
K-1065R	0	52	400	650	Red
	5	13.5	— 38.8	—11.2	
	22	26.9	— 68.8	6.6	
	55	53.8	— 80.0	— 8.9	
	100	65.4	— 95.0	19.0	a
K-1065RR	0	—	—	11145	Red, h
	5	—	—	— 1.3	
	22	—	—	17.4	
	55	—	—	25.5	
	100	—	—	31.6	
	300	—	—	42.6	i
K-1065RB	0	—	30	7650	Red, j
	5	—	— 16.7	—29.7	
	22	—	— 33.3	—39.8	
	55	—	— 50.0	—53.8	
	100	—	— 66.7	—64.1	
METHYL PHENYL VINYL SILICONE RUBBERS					
SE-555R	0	60	430	1555	Red
	5	1.7	— 16.3	—14.0	
	22	8.3	— 41.9	—19.5	
	55	26.7	— 81.4	—49.5	
	100	35.0	— 89.5	—62.3	
	300	60.0	—100.	—59.6	a
81821R	0	61	645	1470	Red
	5	4.9	— 17.8	— 5.2	
	22	14.8	— 47.3	— 8.9	
	55	32.8	— 82.9	—31.5	
	100	41.0	— 92.2	—46.6	a
	300	57.4	—100.	—43.4	a
81821G	0	72	340	1385	Grey
	5	1.4	— 17.6	— 5.1	
	22	8.3	— 42.6	—19.2	k
	55	18.1	— 76.5	—28.5	l
	100	20.8	— 88.2	—41.3	a, l
	300	34.7	—100.	—31.1	a, l
SUPPLEMENTAL PLASTICS					
FLUOROCARBON					
R-20 Film	0	—	160	8830	Clear, j
	5	—	— 18.8	— 6.7	
	22	—	— 31.3	— 9.4	
	55	—	— 43.8	—15.0	m
	100	—	— 75.0	—20.1	n
	300	—	— 96.9	—49.7	o
	500	—	—100.	—48.4	p
R-22 Film	0	—	120	9665	Clear, j
	5	—	8.3	—12.8	
	22	—	— 8.3	—18.5	
	55	—	— 50.0	—27.6	m
	100	—	— 75.0	—51.1	n
	300	—	— 83.0	—52.9	o
	500	—	— 95.8	—51.1	p
FORMALDEHYDE					
Delrin (.010-inch thick)	0	—	70	10910	White, j
	0.65	—	— 28.6	— 2.9	
	1.32	—	— 28.6	— 5.9	
	2.00	—	— 28.6	— 9.3	
	5.00	—	—100.	—33.3	a
Delrin (.020-inch thick)	0	75D	70	10450	White, q
	0.65	2.7	0.0	— 1.2	
	1.32	5.3	— 14.1	— 5.5	
	2.00	8.0	— 78.6	—14.2	
	5.00	12.00	—100.	—32.9	a
PROPYLENE					
Pro-Fax	0	75D	70	4660	Light Tan
	2	1.3	— 57.1	5.4	
	5	1.3	— 57.1	5.3	
	22	0.0	—100.	—60.7	a, n
	55	0.0	—100.	—73.9	a, r
	100	— 1.3	—100.	—77.7	a, r
	300	— 2.7	—100.	—53.5	a, r, c
	500	— 9.3	—100.	—38.4	a, r, c
	1000	—28.0	— 57.1	—55.9	a, r, s
URETHANE					
Estane VC	0	87	500	6390	Amber
	100	1.1	0.0	—28.7	
	300	2.3	— 52.0	—60.8	r
	500	3.4	— 68.0	—63.1	r
	1000	5.7	— 82.0	—64.1	r
Estane VC Black	0	91	540	6290	Black
	100	1.1	— 16.7	—53.4	
	300	2.2	— 67.6	—59.3	
	500	2.2	— 77.8	—59.3	
	1000	4.4	— 89.8	—63.9	

Remarks: a=broke when bent 180 degrees; b=very slightly tacky; c=slightly tacky; d=very light grey; e=slightly darker grey; f=light blue-grey; g=darker blue-grey; h=hardness and elongation not applicable; i=peeled and chipped slightly when bent 180 degrees; j=hardness not applicable; k=light green-grey; l=darker green-grey; m=light yellow; n=light amber; o=bright yellow; p=dark amber; q=Shore D hardness used; r=slightly darker amber; s=oily on surface.

and elongation were decreased out to a dose of about 1×10^8 r. At a dose of 3×10^8 r the elongation had dropped to zero while the tensile strength appeared to be increasing slightly. The SE-555 material did not break when subjected to the bend test after a dose of 1×10^8 r. Apparently the iron oxide filler renders this material slightly more radiation resistant as compared to either the plain SE-555 *(2)* or the material which had a small percentage of titanium dioxide *(4)* added.

Silicone Rubbers—Glass Tape. It is interesting to note the effect of the weave of glass cloth on the tensile strength of the two silicone rubber-glass cloth composite materials. K-1605GR on regular weave was increased in tensile strength similar to the unsupported control K-1605R. As the radiation exposures were not severe enough to affect the glass cloth tape, the increases in tensile strength are due to the silicone elastomer itself. In the case of a bias weave composite, the tensile strength was reduced with increased radiation exposure. Here it is felt that the elongation of the sample permitted by the bias weave construction caused movement of the glass fibers, tearing and weakening the rubber, which resulted in abnormally low tensile strength values. Both of the composite materials were in better condition after the highest exposure of 3×10^8 r than was the K-1605R material. This is attributed to the reinforcing action of the glass tape. On the basis of flexibility, the bias weave material appeared to give slightly better protection than the regular glass weave. The bias weave construction apparently afforded sufficient movement so that the silicone rubber did not chip or peel from the glass during the bend test.

Silicone Rubbers with Post Cure. The effects of radiation on the two Silastic S2201 materials were much the same as were shown for the previously reported *(2)* K-1047R materials. The silastics (dimethyl) and the K-1047R's (methyl vinyl) with no post cure were both reduced in tensile strength at the low and intermediate doses before assuming an increase at about 1×10^8 r. The fully post cured materials were slightly increased in tensile strength as the radiation exposure was increased.

Plastics

Fluorocarbon. The R-20 and R-22 film materials are relatively new types of plastics. They are classed as polyvinyl fluorides and differ only in that the R-22 material had its surface treated to promote adhesion to other materials. Both of these materials showed good radiation resistance considering the fact that they are fluorine-containing compounds. They both were decreased in tensile strength and elongation as the radiation exposure was increased. As the materials were in the order of two mil thick films, no hardness measurements were made. At the highest dose examined, 5×10^8 r, they still possessed a little strength and did not break when subjected to the bend test. The R-22 was slightly more resistant to radiation. This is attributed to the modified surface which apparently afforded a small degree of protection.

Formaldehyde. The polyformaldehyde Delrin acetal resin was extremely poor in its resistance to the damaging effects of radiation. Both ten and twenty mil thicknesses of the material were badly damaged at the relatively low dose of 5×10^5 r. This, together with the odor of formaldehyde from the specimens, suggests that the material undergoes chain cleavage as a result of radiation exposure.

Propylene. This material also appears to undergo chain cleavage from radiation exposure as it was severely damaged at a dose of 2.2×10^7 r. It was quite brittle, lost all of its elongation, was discolored, and lost a substantial amount of its tensile strength. It is interesting to note that as the radiation exposure was increased the material became softer, more flexible, and eventually retained some of its elongation. At the high dose of 1×10^9 r the surface of the material was quite oily. Apparently radiation chain cleaves this material to the extent that low molecular weight fractions are produced which tend to plasticize the rest of the material.

Urethane. The two Estane VC polyurethane plastics studied here were very resistant to radiation as compared with the other materials evaluated. A limited amount of test material precluded studies at the lower doses. Studies at the higher exposures show that, as the radiation dose is increased, the tensile strength and elongation are reduced while the hardness is increased. At the highest dose studied, 1×10^9 r, both compounds possessed a fair amount of strength, were quite flexible, and did not break when subjected to the bend test. These materials, like their rubber counterparts *(2)*, can be ranked among the organic solids which are superior in radiation resistance. No appreciable differences were noted between the natural material and the one containing carbon black.

ACKNOWLEDGEMENT

Acknowledgement is made to the various suppliers of materials for their cooperation in submitting test samples and pertinent materials information. It should be noted that many of the materials evaluated might never have been developed or intended by the manufacturers for the conditions to which they have been subjected. Any failure or poor performance of a material is not necessarily indicative of the utility of the material under less stringent conditions or for other applications.

Acknowledgement is also made to D. L. Hunke of the Phillips Petroleum Co., Idaho Falls, Idaho, operators of the MTR for the A.E.C., and to F. M. Newby of the Hanford Atomic Products Operation, General Electric Co. for their assistance and cooperation in carrying out the irradiations.

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TABLE V—EFFECT OF GAMMA RADIATION ON SUPPLEMENTAL ELASTOMERS AND PLASTICS (CONT'D.)

Materials	Dose ($r \times 10^{-6}$)	Initial Properties and Per Cent Change: Hardness Shore A; Δ%	Elongation %; Δ%	Tensile psi; Δ%	Remarks
METHYL VINYL SILICONE RUBBERS (CONT'D.)					
Silastic S2071 B-2	0	55	265	880	Red
	5	14.6	— 33.7	3.5	
	22	29.6	— 58.3	— 6.0	
	55	47.3	— 81.1	—16.6	
	100	52.8	— 86.8	—23.5	a
	300	74.6	—100.	— 8.1	a
Silastic S2081	0	55	375	800	Red
	5	16.4	— 42.4	— 4.9	
	22	32.7	— 70.5	— 7.7	
	55	47.3	— 86.6	— 9.2	
	100	61.8	— 94.6	—21.4	a
	300	76.4	—100.	— 9.2	a
SE-975	0	73	215	910	White
	5	8.2	— 34.6	6.6	
	22	15.1	— 62.6	5.1	
	55	23.3	— 86.0	—12.6	a
	100	27.4	— 93.0	13.3	a
	300	34.3	—100.	28.7	a
SE-452	0	54	370	935	White
	5	9.3	— 21.6	6.8	
	22	27.8	— 66.2	—15.0	
	55	32.5	— 82.4	—29.1	
	100	61.1	— 91.9	—30.5	a
	300	72.2	—100.	—39.9	a
SE-472	0	75	200	875	White
	5	4.0	— 20.0	6.7	
	22	12.0	— 52.5	15.3	
	55	21.3	— 80.0	2.1	a
	100	24.0	— 85.0	—12.2	a
	300	29.3	—100.	— 4.1	a
SE-482	0	81	220	1025	White
	5	2.5	— 22.7	0.0	
	22	8.6	— 61.4	— 5.3	
	55	13.6	— 81.8	— 8.9	a
	100	17.3	— 90.9	—10.4	a
	300	21.0	—100.	—27.5	a
XK-1057	0	69	150	755	White
	5	7.2	— 20.0	2.9	f
	22	18.8	— 46.7	26.4	g
	55	29.0	— 66.7	45.3	a, g
	100	34.8	— 93.3	88.3	a, g
K-1065R	0	52	400	650	Red
	5	13.5	— 38.8	—11.2	
	22	26.9	— 68.8	6.6	
	55	53.8	— 80.0	— 8.9	
	100	65.4	— 95.0	19.0	a
K-1065RR	0	—	—	11145	Red, h
	5	—	—	— 1.3	
	22	—	—	17.4	
	55	—	—	25.5	
	100	—	—	31.6	
	300	—	—	42.6	i
K-1065RB	0	—	30	7650	Red, j
	5	—	— 16.7	—29.7	
	22	—	— 33.3	—39.8	
	55	—	— 50.0	—53.8	
	100	—	— 66.7	—64.1	
METHYL PHENYL VINYL SILICONE RUBBERS					
SE-555R	0	60	430	1555	Red
	5	1.7	— 16.3	—14.0	
	22	8.3	— 41.9	—19.5	
	55	26.7	— 81.4	—49.5	
	100	35.0	— 89.5	—62.3	
	300	60.0	—100.	—59.6	a
81821R	0	61	645	1470	Red
	5	4.9	— 17.8	— 5.2	
	22	14.8	— 47.3	— 8.9	
	55	32.8	— 82.9	—31.5	
	100	41.0	— 92.2	—46.6	a
	300	57.4	—100.	—43.4	a
81821G	0	72	340	1385	Grey
	5	1.4	— 17.6	— 5.1	
	22	8.3	— 42.6	—19.2	k
	55	18.1	— 76.5	—28.5	l
	100	20.8	— 88.2	—41.3	a, l
	300	34.7	—100.	—31.1	a, l
SUPPLEMENTAL PLASTICS					
FLUOROCARBON					
R-20 Film	0	—	160	8830	Clear, j
	5	—	— 18.8	— 6.7	
	22	—	— 31.3	— 9.4	
	55	—	— 43.8	—15.0	m
	100	—	— 75.0	—20.1	n
	300	—	— 96.9	—49.7	o
	500	—	—100.	—48.4	p
R-22 Film	0	—	120	9665	Clear, j
	5	—	8.3	—12.8	
	22	—	— 8.3	—18.5	
	55	—	— 50.0	—27.6	m
	100	—	— 75.0	—51.1	n
	300	—	— 83.0	—52.9	o
	500	—	— 95.8	—51.1	p
FORMALDEHYDE					
Delrin (.010-inch thick)	0	—	70	10910	White, j
	0.65	—	— 28.6	— 2.9	
	1.32	—	— 28.6	— 5.9	
	2.00	—	— 28.6	— 9.3	
	5.00	—	—100.	—33.3	a
Delrin (.020-inch thick)	0	75D	70	10450	White, q
	0.65	2.7	0.0	— 1.2	
	1.32	5.3	— 14.1	— 5.5	
	2.00	8.0	— 78.6	—14.2	
	5.00	12.00	—100.	—32.9	a
PROPYLENE					
Pro-Fax	0	75D	70	4660	Light Tan
	2	1.3	— 57.1	5.4	
	5	1.3	— 57.1	5.3	
	22	0.0	—100.	—60.7	a, n
	55	0.0	—100.	—73.9	a, r
	100	— 1.3	—100.	—77.7	a, r
	300	— 2.7	—100.	—53.5	a, r, c
	500	— 9.3	—100.	—38.4	a, r, c
	1000	—28.0	— 57.1	—55.9	a, r, s
URETHANE					
Estane VC	0	87	500	6390	Amber
	100	1.1	0.0	—28.7	
	300	2.3	— 52.0	—60.8	r
	500	3.4	— 68.0	—63.1	r
	1000	5.7	— 82.0	—64.1	r
Estane VC Black	0	91	540	6290	Black
	100	1.1	— 16.7	—53.4	
	300	2.2	— 67.6	—59.3	
	500	2.2	— 77.8	—59.3	
	1000	4.4	— 89.8	—63.9	

Remarks: a=broke when bent 180 degrees; b=very slightly tacky; c=slightly tacky; d=very light grey; e=slightly darker grey; f=light blue-grey; g=darker blue-grey; h=hardness and elongation not applicable; i=peeled and chipped slightly when bent 180 degrees; j=hardness not applicable; k=light green-grey; l=darker green-grey; m=light yellow; n=light amber; o=bright yellow; p=dark amber; q=Shore D hardness used; r=slightly darker amber; s=oily on surface.

and elongation were decreased out to a dose of about 1 x 10^8 r. At a dose of 3 x 10^8 r the elongation had dropped to zero while the tensile strength appeared to be increasing slightly. The SE-555 material did not break when subjected to the bend test after a dose of 1 x 10^8 r. Apparently the iron oxide filler renders this material slightly more radiation resistant as compared to either the plain SE-555 *(2)* or the material which had a small percentage of titanium dioxide *(4)* added.

Silicone Rubbers—Glass Tape. It is interesting to note the effect of the weave of glass cloth on the tensile strength of the two silicone rubber-glass cloth composite materials. K-1605GR on regular weave was increased in tensile strength similar to the unsupported control K-1605R. As the radiation exposures were not severe enough to affect the glass cloth tape, the increases in tensile strength are due to the silicone elastomer itself. In the case of a bias weave composite, the tensile strength was reduced with increased radiation exposure. Here it is felt that the elongation of the sample permitted by the bias weave construction caused movement of the glass fibers, tearing and weakening the rubber, which resulted in abnormally low tensile strength values. Both of the composite materials were in better condition after the highest exposure of 3 x 10^8 r than was the K-1605R material. This is attributed to the reinforcing action of the glass tape. On the basis of flexibility, the bias weave material appeared to give slightly better protection than the regular glass weave. The bias weave construction apparently afforded sufficient movement so that the silicone rubber did not chip or peel from the glass during the bend test.

Silicone Rubbers with Post Cure. The effects of radiation on the two Silastic S2201 materials were much the same as were shown for the previously reported *(2)* K-1047R materials. The silastics (dimethyl) and the K-1047R's (methyl vinyl) with no post cure were both reduced in tensile strength at the low and intermediate doses before assuming an increase at about 1 x 10^8 r. The fully post cured materials were slightly increased in tensile strength as the radiation exposure was increased.

Plastics

Fluorocarbon. The R-20 and R-22 film materials are relatively new types of plastics. They are classed as polyvinyl fluorides and differ only in that the R-22 material had its surface treated to promote adhesion to other materials. Both of these materials showed good radiation resistance considering the fact that they are fluorine-containing compounds. They both were decreased in tensile strength and elongation as the radiation exposure was increased. As the materials were in the order of two mil thick films, no hardness measurements were made. At the highest dose examined, 5 x 10^8 r, they still possessed a little strength and did not break when subjected to the bend test. The R-22 was slightly more resistant to radiation. This is attributed to the modified surface which apparently afforded a small degree of protection.

Formaldehyde. The polyformaldehyde Delrin acetal resin was extremely poor in its resistance to the damaging effects of radiation. Both ten and twenty mil thicknesses of the material were badly damaged at the relatively low dose of 5 x 10^6 r. This, together with the odor of formaldehyde from the specimens, suggests that the material undergoes chain cleavage as a result of radiation exposure.

Propylene. This material also appears to undergo chain cleavage from radiation exposure as it was severely damaged at a dose of 2.2 x 10^7 r. It was quite brittle, lost all of its elongation, was discolored, and lost a substantial amount of its tensile strength. It is interesting to note that as the radiation exposure was increased the material became softer, more flexible, and eventually retained some of its elongation. At the high dose of 1 x 10^9 r the surface of the material was quite oily. Apparently radiation chain cleaves this material to the extent that low molecular weight fractions are produced which tend to plasticize the rest of the material.

Urethane. The two Estane VC polyurethane plastics studied here were very resistant to radiation as compared with the other materials evaluated. A limited amount of test material precluded studies at the lower doses. Studies at the higher exposures show that, as the radiation dose is increased, the tensile strength and elongation are reduced while the hardness is increased. At the highest dose studied, 1 x 10^9 r, both compounds possessed a fair amount of strength, were quite flexible, and did not break when subjected to the bend test. These materials, like their rubber counterparts *(2)*, can be ranked among the organic solids which are superior in radiation resistance. No appreciable differences were noted between the natural material and the one containing carbon black.

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Acknowledgement is made to the various suppliers of materials for their cooperation in submitting test samples and pertinent materials information. It should be noted that many of the materials evaluated might never have been developed or intended by the manufacturers for the conditions to which they have been subjected. Any failure or poor performance of a material is not necessarily indicative of the utility of the material under less stringent conditions or for other applications.

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One of the newest coated fabrics features resistance to weathering and abrasion, an unlimited range of bright, light-fast colors, and excellent wear properties at high temperatures

Hypalon-coated nylon is most widely used for truck covers at present.

USES OF Hypalon-Coated

MUCH progress has been made in recent years in the development of weather resistant and waterproof coated fabrics that withstand the wear and tear to which tarpaulins and other protective covers of all kinds are exposed. One of the newest among these is nylon coated with chlorosulfonated polyethylene, an elastomer marketed by DuPont under the name Hypalon. Hypalon-coated nylon appeared on the market about two years ago. Since then enough practical experience has been gained with this fabric to permit a first survey of its uses.

Hypalon is a relatively new synthetic rubber, produced by reacting polyethylene with chlorine and sulfur dioxide. It has a number of desirable characteristics which are not found combined in any other elastomer or plastic. Foremost among Hypalon's properties is its resistance to abrasion and weathering. It can be compounded in an unlimited range of bright, light-fast colors. It has greater resistance to deterioration from high temperature than does any other elastomer or plastic used for coating.

When Hypalon is used as a coating on fabrics, special techniques are applied in compounding it and in bonding it to the base material. These compounding and coating techniques, which are usually the secret of the finisher, are important factors governing the serviceability of the finished fabric.

A number of tests have been conducted to assure that the new fabric meets all possible service conditions.

Samples of Coverlight-H Hypalon-coated nylon, for instance, were subjected to a DuPont scrub test at an independent commercial testing laboratory. The testing device imparts a strong scrubbing action under pressure to the test specimen. The number of operating cycles needed to wear away a coating is used as an index of the service durability of the coating. The samples submitted had survived 3,000 cycles on their face sides without wearing away the coating before the test was stopped as serving no further practical purpose.

When tested on the back side in the warp direction, the coatings were worn away after 1,800 cycles, and in the filling direction after 2,400 cycles. This abrasion and flexing resistance exceeds by far that known for any other coating. In the same test, nylon fabrics coated with vinyl chloride to the same weight as the Hypalon-coated material showed wearing away of the coating after 200 to 400 cycles.

Other samples of Hypalon-coated material were exposed in Florida for more than two years without losing their color or mechanical properties. Some of these samples were constantly flexed during the exposure without noticeable effect on the quality of the material.

Detailed test results are also available to show Hy-

An inflated warehouse made of white Hypalon-coated nylon is used by the U.S. Army. The translucent material allows natural light inside. Portability and low erection costs are among the main advantages of the structure.

Nylon Fabrics

By LANGLEY W. ISOM

Product Manager,
Vulcan Rubber Products Division,
Reeves Brothers, Inc.,
New York, N. Y.

palon's excellent resistance to most chemicals. In applications involving exposure to strong acids, alkalies and oxidizing agents, Hypalon has performed better than any other elastomer presently used for coated fabrics. Its resistance to hydrocarbon solvents is not quite as good as that of neoprene.

Truck and Boat Covers

One of the largest customers for Hypalon-coated nylon is the trucking industry. Among the first users of this fabric for truck tarpaulins was the Burlington Truck Lines, Inc., Galesburg, Ill., a subsidiary of the Burlington Railroad. It ordered its tarps in bright red, the company color, so that the trailers can be more easily identified. Company officials have also satisfied themselves that Hypalon-coated nylon lasts longer and requires less maintenance than any other fabric. After two years of use, none of the first 50 covers ordered shows an abrasion spot.

Many other trucking companies throughout the country have now also changed to Hypalon-coated nylon. The over-all cost factor is usually the decisive one. The initial cost of Hypalon-coated nylon is usually higher than that of conventional fabrics used as truck covers. However, the cost that really matters is the cost per year of operation.

Because of its lightness (about one-third lighter than canvas) a Hypalon-coated truck tarpaulin can generally be handled by one man. The fact that the Hypalon tarpaulin does not stiffen when wet or cold makes for more rapid handling, and the saving in labor cost, even if only a few cents per day, is appreciable for a tarpaulin handled every day in the year.

Further savings are realized from reduced maintenance. A conventional cover costing $100 may require $170 worth of repairs during the three years of its serviceable life. The total cost of $270 for three years thus works out at $90 operating cost per year.

A Hypalon-coated nylon tarpaulin may initially cost more than twice as much as a conventional tarpaulin, but maintenance costs are usually negligible. For repairs, it is not necessary to go to a special repair shop because company personnel can patch a hole in a few minutes with neoprene cement. Since the fabric has been on the market only two years, no experience has been accumulated as to the actual life expectancy of a Hypalon-coated truck cover. However, judging by test results, this may well exceed five years. Thus, the yearly operating costs may eventually prove to be as low as $50 per year.

The fabric is, of course, not only water repellent but completely waterproof. It is flexible, and tear resistant. When white coating is used it is translucent. According to the experiences of one trucker, the fabric, even when punctured by a sharp instrument, will not tear further.

Boat covers of Hypalon-coated nylon can be supplied in all colors, including white. Advantages include a more attractive appearance, complete water repellency, and no rot, mildew or fading.

Color is one of the main attractions of Hypalon-coated nylon for covers on pleasure boats. The yardage of fabric involved for one boat is relatively small, so that initial purchasing cost is not a major consideration. On the other hand, a sparkling white or other attractive color is a strong inducement for a boat owner to use Hypalon-coated nylon in preference to less colorful materials, especially since many of the other properties of the fabric are also of particular advantage for use on boats.

These were the considerations that induced boat owner DeWitt Goddard, Riverhead, N. Y., to become one of the first men on Long Island Sound to try the new fabric. He had the flying bridge covers, hatch covers, and splash curtains for his 57-foot cabin cruiser made of Coverlight-H Hypalon-coated nylon. The covers have gone through two winters outdoors without a sign of rotting, discoloration, mildew or deterioration. The fabricator who made the covers, Irving Mueller, of Riverhead, Long Island, had never before used the fabric, but after supplying it for Mr. Goddard's boat, he used it to make covers for his own boat. In the meantime, many more pleasure boats along the Eastern Seaboard and the Great Lakes have been fitted out with similar covers.

One large eastern shipping company has experimentally covered some life boats of its regular liners with Hypalon-coated nylon in order to compare the performance of this material with that of other materials. The fabric has to withstand the effects of salt water, bleaching ocean sun, and the soot and acid gases coming from the ship's stack. The results after service for one year have been excellent.

Fumigation Covers

Color and durability also were the decisive factors when a large exterminating company in the South chose Hypalon-coated nylon tarpaulins for fumigation work. These tarpaulins are spread over an entire house to retain the gases during the exterminating process. The tarps, which are used over and over again, are exposed to much rough handling.

The company chose Hypalon-coated nylon for economic and promotional reasons. The service life of the material is longer and the maintenance less than with any material previously used. The tarpaulins also retain their good appearance after prolonged use, and this factor, combined with the bright red color for the tarps, serves to advertise the company attractively to passers-by.

Because Hypalon can withstand relatively high temperatures, the coated nylon covers are used for steam fumigation of soil. The much longer service life of these covers as compared to fabrics coated with other elastomers more than offsets the somewhat higher initial costs. The same is true of curtains used on ovens in which concrete is cured with steam.

The following table shows the percentage of the original strength retained by Hypalon and neoprene coated fabrics of the same weight when exposed to 40 pounds (about 290°F.) steam.

Hours	Per Cent Tensile Strength Retained	
	Neoprene	Hypalon
0	100	100
25	93	93
51	80	86
104	80	85
204	80	85
414	13	60
628	7	37
833	6	30

The potential applications of Hypalon-coated fabrics are manifold. In the choice of the material, any one or a combination of the following three factors may be decisive: (1) combined initial cost and maintenance cost of Hypalon-coated nylon is lower than that of other available fabrics; (2) extremely severe service conditions prevail; (3) color is desired.

Fabrication

Fabricating methods with Hypalon-coated nylon do not differ essentially from the methods used with other elastomer-coated fabrics. Seams can be sewed, particularly on vertical surfaces which will not be subject to a pressure of water. Cemented seams, however, are generally preferred, especially for truck covers. These seams are made with an adhesive that is compatible with Hypalon. The adhesive is applied (generally twice) at room temperature to the clean and roughened surface of the fabric. When the cement becomes tacky, the two fabric layers are pressed together. Such seams vulcanize at room temperature, are as strong as the fabric itself, last for the life of the fabric, and are absolutely waterproof.

By R. K. SEIZINGER, S. DAVIS, J. M. McCLELLAN and K. C. FRISCH
Research Division, Wyandotte Chemicals Corp., Wyandotte, Mich.

The Use of Polyether Triols in Urethane Foams

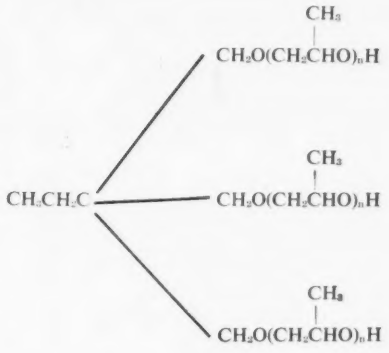
A new series of materials provides a wide range of foam properties

THE USE of flexible foams prepared from polyethers has steadily increased since their commercial introduction in 1956. Their excellent strength and aging properties coupled with good resilience and load-bearing characteristics have resulted in their ready acceptance in many industries, notably the automotive and furniture industries *(1)*.

Several types of polyether polyols are commercially available today. The principal polyether diols are represented by the polypropylene glycols and polyoxypropylene-polyoxyethylene block polymers. Their use in preparing prepolymers and foams, and properties of the foams have been described in various papers *(2, 3, 4)*.

Polyether polyols of functionality greater than two have been used to good advantage in conjunction with the above polyether diols. The polyols contribute faster curing rates, greater gel strength during the foaming operation, and perhaps most important of all, enable one to improve the resilience and vary the load deflection properties as desired. Commercial foams of this kind have been made with combinations of polyether diols and tetrols based on polyoxypropylene-polyoxyethylene block polymers derived from ethylene diamine *(4)*.

A new series of triols, propylene oxide adducts of trimethylolpropane (hereafter referred to as triols), was prepared for evaluation in urethane foams. The general structure of this family of triols is:



Note: This paper was presented at the 15th Annual Technical Conference of the Society of Plastics Engineers, January, 1959.

The approximate molecular weights of the ones chosen for evaluation are shown in Table I.

A foam composition containing polypropylene glycol 2000 molecular weight (PPG 2000) and tolylene diisocyanate (TDI) was selected as a standard for comparison. A series of foams was made with various proportions of PPG 2000 and each triol (except the 400 molecular weight member) as the polyether component and foam properties were measured. It was then possible to relate the proportion of each triol used to general trends in foam properties, and also compare the influence of triol molecular weight.

Properties of foams having the following mole ratios of PPG 2000 to triol were measured: 100/0, 90/10, 80/20, 70/30, 60/40, 40/60, 25/75, and 0/100. Four series of foams containing triols of molecular weight 750, 1500, 2500, and 4000 were made and tested. However, it was difficult to obtain satisfactory foams from the 4000 molecular weight triol alone with the prepolymer process used throughout this study.

It became evident that foams based on the 750 molecular weight triol as the sole polyether would fall outside the region of flexible foams. Therefore, no attempt was made to prepare foams con-

TABLE I—PROPYLENE OXIDE ADDUCTS OF TRIMETHYLOLPROPANE

Typical Molecular Weight	Typical Hydroxyl Number
400	420
750	225
1500	112
2500	67
4000	42

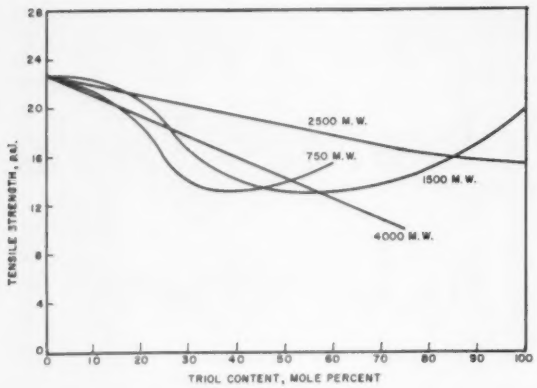


FIG. 1—Effect of triol concentration on tensile strength of PPG 2000-triol foams.

taining more than 60 mole per cent of this triol in combination with polypropylene glycol of 2000 molecular weight.

Because of their interesting properties, rigid foams based on the 400 and 750 molecular weight triols were prepared and evaluated. Due to the different nature of the tests for rigid foams, typical properties are reported separately from the flexible foam study.

Foam Preparation

Urethane prepolymers were prepared by a method similar to that described by Davis, McClellan, and Frisch *(4)*. In the present study, the water content of each polyether was adjusted to 0.3% by weight before reacting it with TDI. The final free isocyanate content of each prepolymer was maintained at 9.5%. Prepolymer viscosities were controlled in the range of 10,000 to 15,000 cps. at 25°C. This helped to maintain a relatively narrow range of foam densities from 2.10 to 2.35 pounds per cubic foot, and minimized the effect of varying density upon the properties being evaluated.

The foaming formulation for the prepolymers was as follows:

	Parts by weight
Component A	
Prepolymer (9.5% NCO)	100.00
Dimethyl silicone oil (50 csts)*	0.40
Component B	
N-Methyl morpholine	1.00
Triethylamine	0.20
Pluronic** Polyol L-64	0.50
Water (115% of theory)	2.34

*DC-200, Dow Corning Corp.; SF-96, General Electric Corp.; L-45, Union Carbide Corp. **Wyandotte Chemicals Corp.

Components A and B were mixed with a high-speed, high-shear mixer (2500 rpm). The mixture was allowed to foam in an open mold and then placed in a circulating air oven at 70°C. for 15 minutes. The foams were crushed and cured at 120°C. for two hours, or at 70°C. for three hours. They were conditioned at 40°C. and 75% relative humidity for three days, followed by four days at 24°C. and 50% relative humidity, prior to testing.

The foam properties measured included density, tensile strength, elongation, tear resistance, compression-deflection, compression set and resilience. All tests were carried out by SPI Tentative Test Methods for Flexible Urethane Foams, with the exception of the resilience test. This property was measured by a falling ball method, and the results were recorded as per cent vertical rebound (Wyandotte Chemicals Corp., "Falling Ball Resilience Test," Method No. FT-106).

Effect of Curing Conditions

Foams cured for two hours at 120°C. were compared with identical foams cured for three hours at 70°C. with respect to individual properties. A statistical analysis of variance was used to determine if any significant difference in each property occurred due to the difference in curing conditions. The analysis was extended to determine if changing triol concentration, or triol molecular weight, had any effect.

The results showed that one set of curing conditions gave about the same foam properties as the other set, within the range of practical significance. The only exception was the data for compression set. The values obtained for foams cured for two hours at 120°C. were 30% lower than those obtained for foams cured for three hours at 70°C.

Once the foregoing was established, the data for the two different curing conditions were combined to provide average values for plotting and analyzing each individual foam property, except in the case of the resilience and compression set properties.

A step-wise approach was used to select the best practical curve which would fit each set of data. Least square curves, followed by analysis of the resulting variance, were used to determine whether a linear, quadratic, or cubic relation provided the best fit. Transcendental functions did not seem to apply in any set of data studied.

TABLE II—COMPRESSION SET VALUES FOR PPG 2000-TRIOL FLEXIBLE FOAMS

Foams cured for 2 hours at 120°C.

Triol Content, Mole Per Cent	% Compression Set* Triol Molecular Weight 750	1500	2500	4000
0	8.0	8.0	8.0	8.0
10	8.9	9.3	8.0	8.4
20	9.0	8.0	7.8	7.2
30	11.1	6.9	7.5	7.4
40	7.1	6.3	7.0	4.8
60	13.3	4.9	5.9	4.3
75	——	4.7	5.8	3.9
100	——	7.9	7.1	—

*90% deflection—ASTM Method B (22 hours).

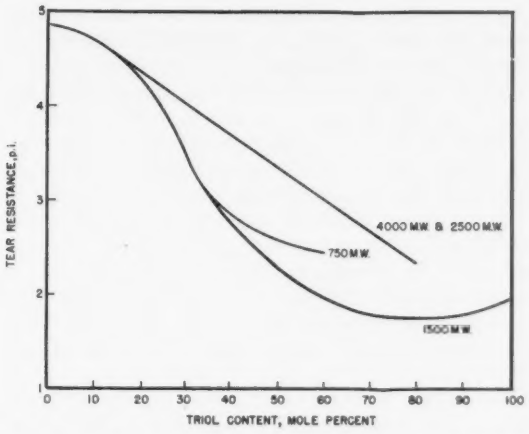


FIG. 2—Effect of triol concentration on tear resistance of PPG 2000-triol foams.

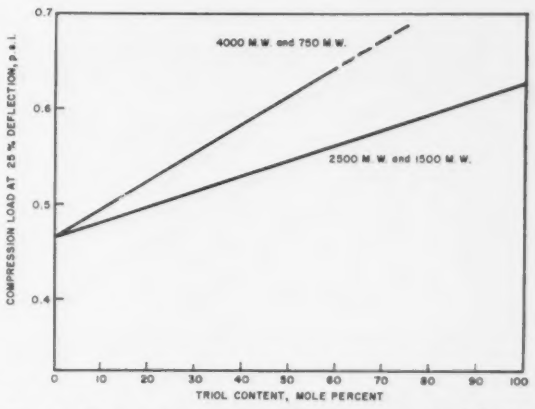


FIG. 4—Effect of triol concentration on compression-deflection of PPG 2000-triol foams.

Physical Properties

Tensile Strength. The general trends of foam tensile strength with increasing proportions of triol are shown in Figure 1. Tensile strengths for all foams containing the 2500 and 4000 M.W. triols decrease as the proportion of triol increases. For the lower molecular weight triols there is relatively little effect on tensile strength up to about 10% triol, after which there is a decline as triol concentrations are increased. In general, use of the 2500 M.W. triol causes the least reduction in tensile strength values.

Tear Resistance. General trends of tear resistance are shown in Figure 2. Again, the tear resistance decreases as increasing proportions of each triol are used in the polymers. The effects of the 2500 M.W. and 4000 M.W. triols are very similar, and their curves coincide. They cause the least reduction in tear resistance. Curves for the 750 and 1500 M.W. coincide up to 30% triol concentration, and they cause a somewhat greater reduction in tear resistance.

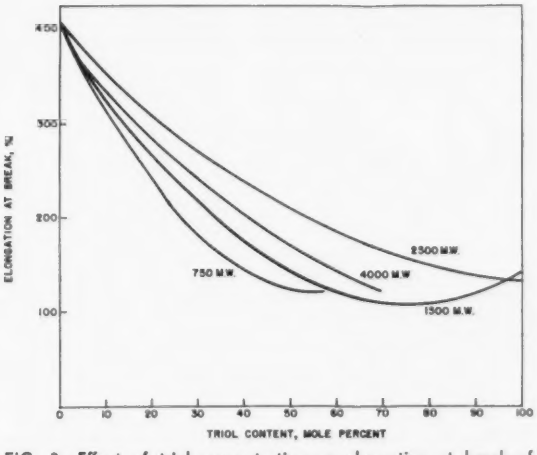


FIG. 3—Effect of triol concentration on elongation at break of PPG 2000-triol foams.

Elongation. The effect of increasing amounts of triols on the per cent elongation at break are shown in Figure 3. With increasing triol content, the per cent elongation falls off rapidly at first, and then at a reduced rate. The effect is most pronounced for the 750, 1500 and 4000 M.W. triols, while the 2500 M.W. triol causes the least reduction.

Compression-Deflection. As shown in Figure 4, the compression load increases with increasing triol concentration. Comparison of the effects at 25% deflection with those at 50% deflection showed a constant ratio of 1.00 to 1.36. After multiplying the 50% deflection values by the reciprocal of 1.36, the two values were combined to yield average figures with much lower standard errors than those of the individual measurements.

The 750 M.W. and 4000 M.W. triols contribute to higher compression-deflection values at any given mole ratio than do the 1500 M.W. and 2500 M.W. triols. At the present time, we have no explanation for this apparent inconsistency in results.

Compression Set. Typical compression set values (90% deflection) for several PPG 2000/triol foams are shown in Table II. With increasing amounts of triol used, the compression set values decrease for combinations with 4000, 2500 and 1500 M.W. triols. A slight increase in compression set was caused by increasing amounts of 750 M.W. triol. This may be explained by the fact that higher amounts of triol 750 result in foams which are representatives of a transition towards semi-rigid or rigid urethane foams.

Based on the statistical evaluation of the compression set values, it was shown that, within 95% confidence limits, the 90% deflection compression set values are less than 10%. It was also noted that the compression set of these triol-containing foams reached their lowest values after a slightly shorter conditioning period than did the unmodified PPG 2000 foam.

Resilience. In Figure 5, the effect of triol modification upon the foam resilience is shown. Foams modified with the 4000 M.W. triol appear to maintain a constant resilience throughout the range stud-

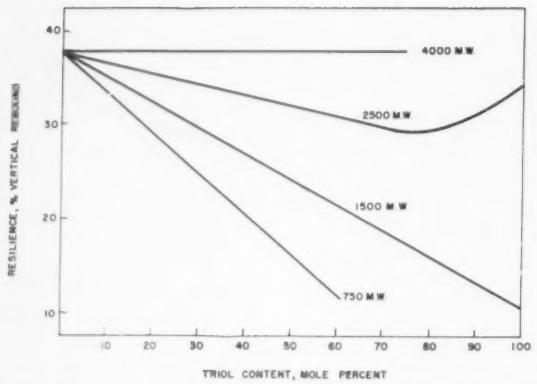


FIG. 5—Effect of triol concentration on resilience of PPG 2000-triol foams.

ied. Those modified with the other triols decrease in resilience with increasing triol content. This effect becomes increasingly pronounced with decreasing triol molecular weight. The curves shown are for the two hour, 120°C. cured foams. Corresponding values for the three hour, 70°C. cure are very slightly lower.

Modification of 1500 M.W. Triol Foams

Because of their low resilience, the properties of 1500 M.W. triol foams containing no PPG 2000 were studied further. The effects upon foam properties of two variables were studied as follows: (1) variation of the free NCO content of the prepolymer, from 8.5 to 10.0%, and (2) variation in the amount of the triethylamine component of the catalyst (from 0 to 0.3 parts). The N-methyl morpholine component of the catalyst was held constant at 1.0 part.

In Figure 6, the effects of changes in the free NCO content of triol 1500/TDI prepolymers on the tensile strength, modulus, and density of resulting foams are shown. When the free NCO content was changed, the water content of the catalyst was also adjusted to maintain 115% of that amount theoretically required to react with the free NCO groups. As expected, the density decrease was proportional to the increase in free NCO content, due to the larger amount of gas liberated during the foaming reaction.

The increase in tensile strength and modulus observed with a concurrent decrease in density was unexpected. An increase in cross-linking density of the foamed polymer may have occurred as the free TDI content of the related prepolymer was increased. This is a possible explanation for the unexpected results indicated here.

No change in the tear resistance, resilience, compression set, or compression load at 25% deflection occurred with the change in free NCO content.

In Figure 7, the effect of the triethylamine content in the catalyst, from 0 to 0.3 part per 100 parts of prepolymer, is shown. As the triethylamine content increased, the foam density decreased due to an increase in the rate of gel strength development and less loss of gas during foaming. The tensile strength, tear resistance, resilience, and compression-deflection decreased. These results are as expected when the density of a given foam decreases. Compression set values at 90% deflection increased with increasing triethylamine content. This dependency of foam properties on catalyst concentration is in accord with previous findings *(5)*.

Results for Flexible Foams

It appears that triols can be used to obtain desirable modifications in the properties of polyether diol-TDI flexible foams:

(1) The load bearing properties, at a constant density, may be increased by use of triols. The 4000

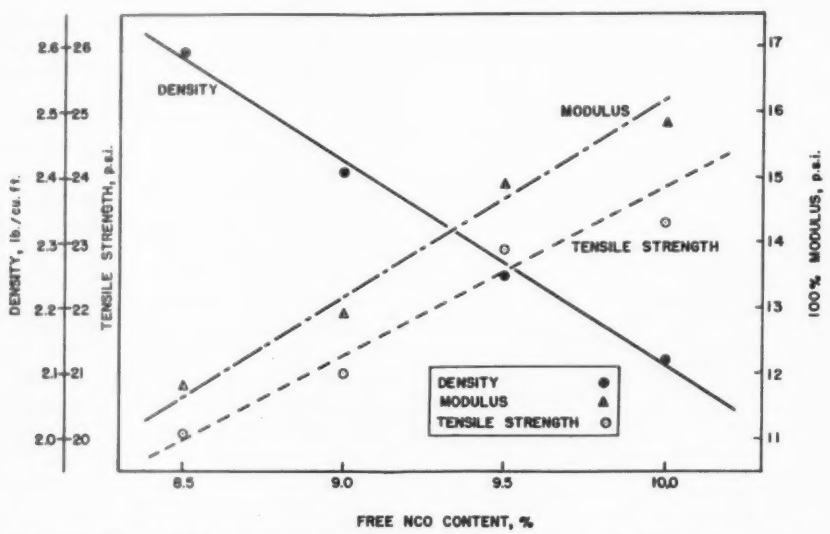


FIG. 6—Effect of NCO content on tensile strength, tensile modulus and density of 1500 M.W. triol foams.

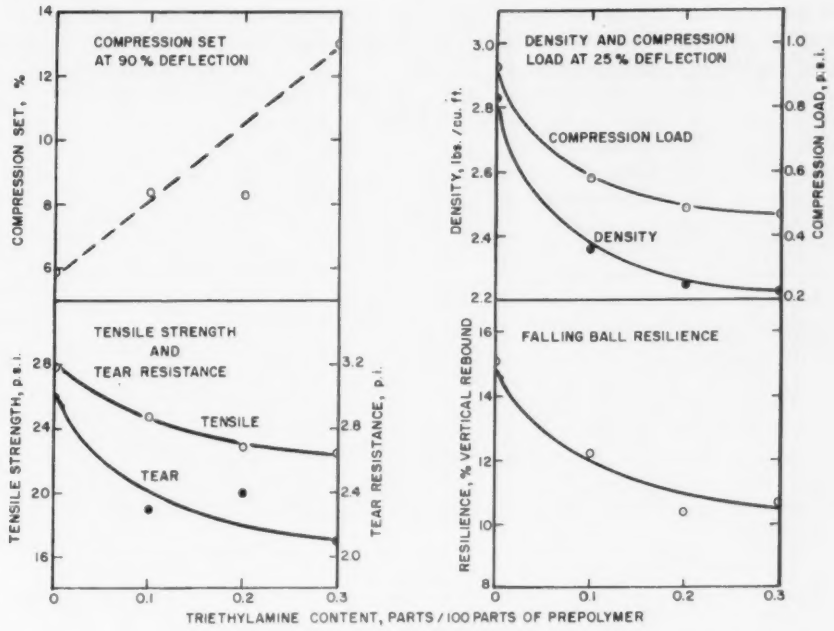


FIG. 7—Properties of 1500 M.W. triol foams.

M.W. triol appears to be a good choice for this purpose, all properties being considered.

(2) The resilience can be retained while modifying other properties, through the use of the 4000 M.W. triol.

(3) The compression set properties of foams were improved by the use of three of the triols tested.

(4) High impact absorbing characteristics were attained through the use of the 1500 M.W. triol.

One or more of the above advantages was obtained at a slight sacrifice in the tensile strength and tear resistance values, and at some reduction in elongation, compared to the properties of PPG 2000-TDI foams.

The use of triols in urethane prepolymers increases the range of combinations of foam properties available to the foam manufacturer.

It should be noted that the particular conditions of curing and post conditioning used in this investigation may not be the ideal ones for all the respective combinations. Improvements can certainly be obtained for any individual formulation by adjusting the variables involved.

TABLE III—TYPICAL PROPERTIES OF RIGID FOAMS

CARBON DIOXIDE BLOWN

Triol molecular weight	400		750	
Density, lb./cu. ft.	1.4	2.8	1.5	3.5
Closed cell content, %[1]	82	83	84	80
Compressive strength, psi[2]	14	49	8	45
Thermal conductivity, K-factor	0.22	0.23	0.22	0.24
Water absorption, lb./cu. ft.[3]	2.1	3.3	3.0	3.7
Heat distortion at 100°C., % deflection[4]	<1	<1	>10	>10

SOLVENT[5] BLOWN

Density, lb./cu. ft.	2.0
Closed cell content, %[1]	90
Compressive strength, psi[2]	40
Thermal conductivity, K-factor	0.14
Water absorption, lb./cu. ft.[3]	2.5
Heat distortion at 120°C., % deflection[4]	None
Dimensional stability, % shrinkage	
120°C., dry, 24 hours	None
70°C., 100% R.H., 2 weeks	None

(1) Measured by air displacement method; (2) Measured on a 1 square inch sample at a speed of 0.5 in./min.; (3) Measured after total immersion of a 2 inches x 2 inches x 1 inch sample at 75°F. under a 10-foot head of water for 48 hours; (4) Measured after a 100-gram load was applied by a circular presser foot having a 1 square inch area onto a 3 inches x 3 inches x 1 inch sample foam for 24 hours; (5) Trichlorofluoromethane (B.P. 23.8°C.).

Rigid Foams

As has been previously mentioned, foams based on combinations of polypropylene glycol of 2000 molecular weight and a triol of 750 molecular weight, in which the triol is in large excess, are too rigid to be considered for flexible foam applications. In fact, foams based on 100% triol of this molecular weight are semi-rigid or rigid.

Rigid foams have been made from triols of 750 and 400 molecular weight, the former by true prepolymer methods and the latter by semi- or quasi-prepolymer methods. By foaming these prepolymers using water and an amine activator, foams varying in density from 1 to 20 pounds per cubic feet that had good dimensional stability, high closed cell content, good heat resistance, low water absorption, and high compressive strength at low densities were prepared.

Typical values for foams of 1.4 to 3.5 pounds per cubic foot density are given in Table III.

Recently, the use of trichlorofluoromethane (b.p. 23.8°C.) has been reported as the blowing agent instead of carbon dioxide generated in the usual urethane foam system *(6)*. Foams based on a 400 molecular weight triol have been prepared by using this low boiling solvent. Among the advantages obtained were lower thermal conductivity, easier processing, higher strength properties, higher closed cell content, better heat resistance, and improved aging characteristics at high humidity. Typical properties of a 400 molecular weight triol solvent blown foam are also given in Table III.

Rigid foams made with 400 M.W. and 750 M.W. triols have good compressive strength, high closed cell content, excellent dimensional stability, excellent insulating properties, and low water absorption. Their consideration for low temperature and moderately high temperature insulation, fragile material packaging, flotation, acoustical, and light weight structural applications is suggested by their properties.

ACKNOWLEDGMENT

The authors wish to express their appreciation to Charles Hamilton for the statistical treatment of the experimental data, to Earl J. Robertson for his contribution on rigid foams, and to T. L. Graham, Jr., for the physical testing data reported in this paper.

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Special Industry Reports

The Special Industry Reports which have been appearing in this journal on a monthly basis have met with enthusiastic reader response. The objective of the series is to furnish to the manufacturer information which he may utilize to enhance his individual operations. In coming months, Special Industry Reports on the following subjects will appear:

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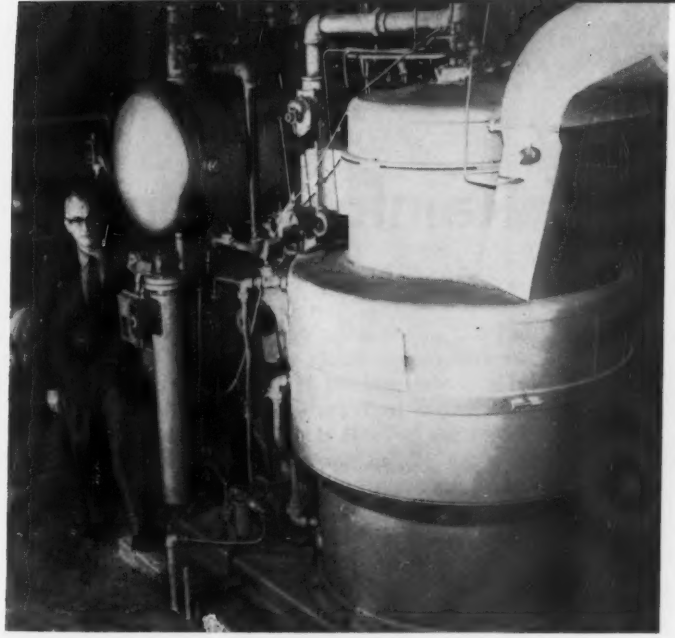


The single 150 bhp package boiler which solved Crown Rubber's steam problem.

How Crown Rubber Solved Its Steam Problem

By CLARENCE E. AUGUSTINE
Plant Manager,
Crown Rubber Co.,
Fremont, Ohio

SHORTAGE of steam was hampering production of rubber goods at the Crown Rubber Company, Fremont, Ohio, and the company was faced with the problem of increasing steam output and reliability, without increasing the size of the existing boiler room. It was solved by replacing the old boilers—two 30 bhp Scotch-Marine type units—with a single 150 bhp package boiler.

Crown Rubber manufactures a variety of rubber specialty products for the consumer trade: carpet cushions, temporary rug cushion, vinyl-top foam rubber cushioned runner and stair covering, anti-fatigue standing mats, conventional rubber stair treads, and utility rubber rug and advertising mats of all types.

The old boilers were inadequate and undependable, and could not supply enough steam under load conditions. More steam was needed but space was at a premium—and therefore the best boiler available was wanted to solve the dilemma. Ease of installation was also important, since the boiler change-over was to be made during a two-week plant vacation period. During this time the old boilers would have to be torn down, the new boiler installed, and the system made completely ready to supply processing and heating steam.

The boiler chosen was a Drum Modulatic Water Tube boiler, manufactured by Vapor Heating Corp., Chicago, Ill. We made a survey of a number of companies using Vapor boilers, sending out 14 inquiries, and getting back 12 answers. All were favorable.

The new boiler arrived during the second week of the vacation period. It was off the truck and in the boiler room in one hour, ready for the piping to be connected. Steam was being produced in the system two days after the boiler was delivered.

The Drum Modulatic is Crown Rubber's second Vapor boiler. The company previously bought a 160 bhp Hi-Pressure Modulatic to supply steam to its 124 foot-long foam rubber curing oven. Steam is used in the oven for curing and drying. Air passes over steam-heated coils, then is used in the curing and drying operation. Both the old and the new boilers are on inter-connected steam lines, and in an emergency, either boiler can carry the processing load. The boilers are about 200 feet apart, positioned closest to the place where steam is used.

The Drum Modulatic boiler usually furnishes steam to the rubber goods division and steam for plant heating. In the rubber goods division, steam-heated platen presses are used, and each of these has about two tons of steel to be heated up before it can start operating. There are four presses and they operate at 320°F. From a cold start it takes about 45 minutes to get them up to temperature. Since the Drum Modulatic takes only five minutes to get up steam pressure, the presses are going in 50 minutes. Because the old boilers took 45 minutes to get up steam pressure, it took an hour and a half to get the presses ready for operation. Forty minutes are saved.

The present cost of steam is estimated at about 10% less than before conversion to the Drum Modulatic. A Johnson closed condensate return system is used on the boiler, and there have been considerable savings in treated make-up water.

Prior to installation of the new boiler, an open system with flash steam venting to the atmosphere was used. There was always a wet condition in the boiler room. Now that is eliminated, and the boiler room is clean, neat and dry.

The old boilers necessitated two 65-foot high stacks that were a maintenance problem. They had to be painted yearly. Installation of the Drum Modulatic boiler eliminated one stack, reduced the other in height, and also did away with the yearly painting job. The Drum boiler fits in the space previously occupied by one of the 30 bhp Scotch-Marine type boilers, thus releasing valuable space in the boiler room.

The Chemistry of Reinforcement

IV—A Model System Based on Carbon Black, Squalene, TMTD and Laurex

By MERTON L. STUDEBAKER

and

LESTER G. NABORS

Rubber Chemicals Div.,
Phillips Chemical Co.,
Akron, Ohio

IN THE first three papers of this series *(1, 2)* carbon black was shown to display considerable reactivity towards a number of materials, some of which are present in rubber during vulcanization. These studies are carried a step further in the present paper by examination of a model system for a carbon black loaded, TMTD ("sulfurless") cure.

The mixtures selected were formulated as follows:

	Parts by weight
Squalene	100.0
Carbon black (Various)	50.0
TMTD (Tetramethylthiuram disulfide)	3.5
Laurex (Commercial zinc laurate)	20.0

The mixtures were heated at 150°C. in open test tubes for one hour, cooled, extracted with toluene for 30 days and vacuum dried for 48 hours at 148°C. They were then analyzed for nitrogen, total sulfur, inorganic sulfide sulfur and zinc. The analyses of the untreated carbon blacks are presented in Table I. In Table II, the analyses of the carbon blacks removed by extraction from the mixtures are tabulated

The data in Table II indicate that quite appreciable quantities of zinc remained on the carbon black—considerably more than can be accounted for as zinc sulfide. It was thought possible that the zinc might be associated with the carbon black as half-salts of the types *(3)*:

Carbon Black Particle -O-Zn-Laurate, I

Carbon Black Particle -S-Zn-Laurate, II

Carbon Black Particle -O-Zn-S-C-N$(CH_3)_2$ or III

Carbon Black Particle -S-Zn-S-C-N$(CH_3)_2$ IV

We would expect acetic acid to react with such half-salts to remove the zinc. If so, treatment of the samples containing half-salts of Types III and IV with acetic acid should reduce their zinc, sulfur and nitrogen contents in stoichiometric amounts.

Accordingly, the carbon black samples of Table II were given a further seven-day extraction with glacial acetic acid followed by a seven-day extraction with deionized water and finally vacuum dried at 146°C. for 48 hours. These samples were then ana-

TABLE I—ANALYSES OF UNTREATED SAMPLES

Carbon Black	Type	BET Surface Area (m^2/g)	% H	% C	% Ash	% S	% O by Difference
Philblack A	FEF	45.8	0.38	98.41	0.16	0.67	0.58
Philblack O	HAF	79.8	0.34	97.96	0.32	0.59	0.79
Philblack I	ISAF	116.8	0.32	97.56	0.44	0.51	1.17
Philblack E	SAF	135.1	0.33	97.55	0.47	0.64	1.01
Vulcan SC	SCF	194.4	0.21	97.40	0.61	0.60	1.18
Spheron 9	EPC	115.8	0.66	95.64	0.02	0.19	3.49
Spheron 6	MPC	120.0	0.60	96.21	0.04	0.05	3.10
Spheron 4	HPC	152.7	0.52	96.16	0.04	0.00	3.28
Spheron C	CC	253.7	0.45	96.39	0.01	0.01	3.14

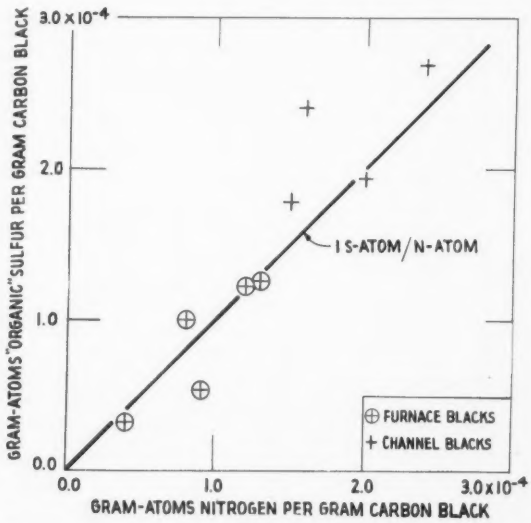


FIG. 1—Nitrogen and organic sulfur content of samples which were extracted with chloroform only.

TABLE II—ANALYSES OF SAMPLES FROM TABLE I AFTER TREATMENT WITH SQUALENE-TMTD-LAUREX MIXTURE, TOLUENE EXTRACTION AND VACUUM DRYING

Carbon Black	Analyses on Weight Per Cent Basis					Gram-Atoms per Gram Carbon Black		
	N	S_{Total}	$S_{Sulfide}$[1]	△Organic S[2]	Zn_{Total}	N	△Organic S	Zn[3]
Philblack A	0.06	0.82	0.05	0.10	0.26	$0.4x^{-4}$	0.3_1x10^{-4}	$0.23x10^{-4}$
Philblack O	0.12	0.96	0.16	0.17	0.71	0.9	0.5_8	0.58
Philblack I	0.11	1.00	0.17	0.32	0.79	0.8	1.0	0.67
Philblack E	0.17	1.17	0.14	0.39	0.82	1.2	1.2_2	0.81
Vulcan SC	0.18	1.12	0.12	0.40	0.77	1.3	1.2_5	0.81
Spheron 9	0.28	0.85	0.04	0.62	0.63	2.0	1.9_3	0.84
Spheron 6	0.21	0.67	0.05	0.57	0.48	1.5	1.7_8	0.58
Spheron 4	0.22	0.85	0.08	0.77	0.75	1.6	2.4	0.90
Spheron C	0.33	0.94	0.07	0.86	0.85	2.4	2.6_8	1.09

(1) "Inorganic" sulfide sulfur evolved as H_2S when sample is treated with 50:50 mixture of ether and concentrated hydrochloric acid.
(2) (Total sulfur) — (sulfide sulfur) — (sulfur content of untreated carbon black).
(3) Zinc content corrected for zinc present as ZnS, e.g., one zinc atom deducted from zinc content of sample for each molecule of H_2S evolved on treatment with HCl.

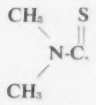
lyzed for nitrogen, sulfur, zinc and inorganic sulfide (Table III). No trace of inorganic sulfide sulfur was found. The zinc contents were very small, but quite substantial amounts of sulfur and nitrogen were retained by the carbon blacks.

Discussion

The most striking feature of the study is to be found in the sulfur and nitrogen analyses. Figure 1 is a plot of the increases in nitrogen and of organic sulfur for the samples which were treated with the squalene-TMTD-Laurex mixture and then extracted with toluene. Within the probable experimental accuracy of the data, there is a one-to-one correlation between the number of sulfur atoms and the number of nitrogen atoms which are added to the sample. The quantities of nitrogen and sulfur added to the sample do not appear to be related to the zinc content of the toluene extracted samples.

Extraction with glacial acetic acid, a rather severe treatment, removed almost all of the zinc and lowered the nitrogen and sulfur contents somewhat (Figure 2). However, when the values for nitrogen and sulfur remaining on the carbon black after this extraction are compared, the correlation is as satisfactory as for samples which were extracted with toluene only; and again one added nitrogen atom is found for each sulfur atom added to and retained by the original carbon black samples. The quantities of nitrogen and sulfur removed by the glacial acetic acid treatment do not appear to be related to the quantities of zinc removed from the samples.

This suggests that the nitrogen and sulfur were added to the carbon black as dimethylthiocarbamyl radicals,



The presence of these radicals as by-products of TMTD sulfurless cures has been suggested by Bielstein and Scheele *(4)*, Ferington and Tobolsky *(5)* and others. The present study suggests that these radicals

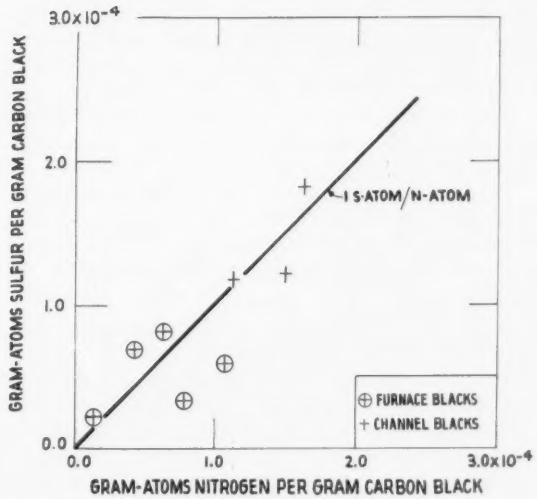


FIG. 2—Nitrogen and organic sulfur content of samples which were extracted with chloroform and glacial acetic acid.

TABLE III—ANALYSIS OF SAMPLES FROM TABLE II AFTER EXTRACTION WITH GLACIAL ACETIC ACID FOLLOWED BY DISTILLED WATER AND VACUUM DRYING

Carbon Black	Analyses on Weight Per Cent Basis				Gram-Atoms per Gram Carbon Black		
	% N	% S	Δ%S[1]	Zn	N	ΔS[1]	Zn
Philblack A	0.02	0.74	0.07	0.005	0.1_4x10^{-4}	0.2_2x10^{-4}	$.00_8x10^{-4}$
Philblack O	0.11	0.70	0.11	0.01	0.7_8	0.3_4	$.01_5$
Philblack I	0.06	0.73	0.22	0.01	0.4_2	0.6_9	$.01_5$
Philblack E	0.09	0.90	0.26	0.01	0.6_4	0.8_1	$.01_5$
Vulcan SC	0.15	0.79	0.19	0.01_5	1.0	0.5_7	.02
Spheron 9	0.21	0.58	0.39	0.01	1.5	1.2_2	$.01_5$
Spheron 4	0.45[2]	0.51	0.51	0.01_6	3.2_1[2]	1.5_9	$.02_3$
Spheron 6	0.16	0.43	0.38	0.01_6	1.1_4	1.1_8	.02
Spheron C	0.23	0.59	0.58	0.02_3	1.6_1	1.8_1	$.03_1$

(1) Increase in sulfur content over untreated sample.
(2) Obviously in error since this value is considerably higher than that for the Spheron 4 sample of Table II. This value is not shown on Figure 2.

react with, or at least are localized at, or near, the carbon black surface.

The carbons listed in the present study are all rubber-grade carbon blacks. High oxygen ink blacks tend to give even higher ratios of nitrogen atoms to sulfur atoms following the treatments described in this paper than the one-to-one ratio found for rubber-grade carbon blacks.

ACKNOWLEDGMENT

Ultimate analyses were run by the Huffman Microanalytical Laboratories, Wheatridge, Colorado.

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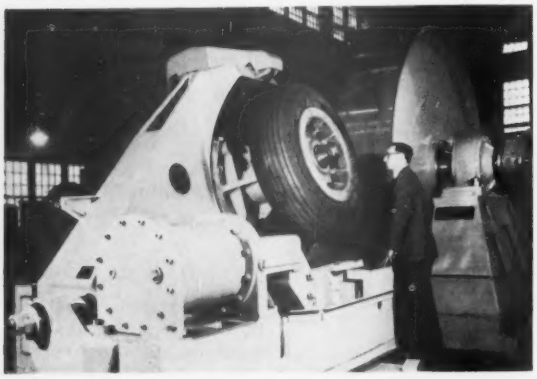
Testing Tires for Supersonic Aircraft

A NEW tire tester which accelerates from zero to 300 miles per hour in 20 seconds allows the Air Force to "floorboard the pedal" in testing experimental tires for supersonic aircraft. Built by Adamson United Co., Akron, Ohio for the Air Research and Development Command's Wright Air Development Center, Dayton, Ohio, the equipment is being used to study physical deterioration and heat fatigue encountered by tires during high speed takeoffs and landings.

The new facility is also designed to simulate landing deceleration. Where other tire testing machines decelerate at 3 to 10 feet per second, the new machine decelerates from 300 miles per hour to zero speed at 24 feet per second—or in 18 seconds.

At the core of the machine is a 120-inch flywheel which rotates up to 900 revolutions per minute simulating a ground roll of 300 miles per hour. Test tires rolling against the flywheel undergo the same loads as are imposed by the aircraft. The testing facility is said to simulate takeoff or landing conditions of any supersonic aircraft. An automatic preset programmer applies precise speeds and loads to duplicate the condition of any high-speed jet rolling down the runway.



An engineer checking the giant new tire testing device designed for testing aircraft tires. The unit will spin tires against a 10-foot flywheel at up to 300 miles per hour.

The testing facility covers 3600 square feet of floor space. About 30 feet high, it is anchored 15 feet below the floor surface in 400 cubic yards of reinforced concrete. The flywheel is enclosed in a sound-proofed steel shell of ¼-inch thick boiler plate, with several 1-inch thick observation windows protected by a steel mesh fence.

Dual carriages accommodate fighter or bomber type tires on each side of the flywheel. One carriage, built to take a maximum load of 60,000 pounds, is used for bomber or transport aircraft tires. The other carriage tests tires up to 25,000 pound loads.

The carriages swivel in two directions to apply camber effects (up to 15 degrees) and yaw effects (up to 20 degrees). Combinations of the two effects can be applied to reproduce any deteriorating tread scrubbing and carcass stresses on the tire, as would be caused by undercarriage movement, cross-wind or turning loads.

A control panel equipped with temperature recording devices is located separately and to one side of the tire tester.

Since initial "pull-out" under maximum motor overload requires 9500 horsepower and draws 1500 amperes from a 6900-volt power supply, an "annunciator" was placed in the control panel to warn operators of excessive loads on the motor during tests.

The electric drive is water cooled by an 80-ton heat-absorption refrigerating unit. Its two 1000-gallon water tanks are beneath the floor surface.

Air cooling fans close to the carriages inside the facility are used to cool "hot" tires quickly. All load conditions are applied pneumatically. Control systems and air storage tanks are located on top of the facility.

Roger M. Wilcox, Chief of the Undercarriage Test Facility in the Aircraft Laboratory, reports that it is the first to reproduce the high-speed takeoff of a supersonic aircraft. Heat encountered during the takeoff roll sometimes exceeds the curing heat temperature of aircraft tires, according to Mr. Wilcox. The facility will be used to study heat fatigue and dynamic breakdown under accelerated conditions so that more durable tires can be developed.

EDITORIAL

Rubber Red Book—12th Edition

► Readers of this journal will be pleased to note that copies of the 1959 RUBBER RED BOOK are now in the mails. First published in 1937 and every two years thereafter, the 1959 RUBBER RED BOOK represents the beginning of a new era for us as publishers as well as for the rubber industry. The growth of the rubber industry since World War II has been nothing short of phenomenal. Publication of the RUBBER RED BOOK every two years reduced its practical value as an up-to-date reflection of the rubber industry—its products and its personnel. Accordingly, with the 1959 edition, the RUBBER RED BOOK will be published on an annual basis.

Since 1937 the directory has been published as a hard bound book measuring 6 by 9 inches. With the growth of the industry the directory became increasingly difficult to handle in that format. The 1959 edition has been changed to a new size, 8¼ by 11¼ inches, and features a newly designed soft cover. The new size has permitted us to reduce the number of pages in the book while still allowing the publication of all the data which has made the RUBBER RED BOOK so valuable through the years. We believe the new edition is easier to handle and we hope that you will agree with us.

The new edition of the RUBBER RED BOOK, like its predecessors, reflects the continuing growth of the rubber industry. Even though we are intimately involved with the rubber industry, we are singularly amazed and gratified by its continuing growth and its ability to adapt to new circumstances with a minimum of confusion. No wonder that it continues to be one of the healthiest segments in the industrial scene.

Special Industry Report

Advantages of FACTORING

To the Rubber Manufacturer

ONE OF the severest barriers to the growth of many small to moderate-sized businesses which are typical of the rubber-products industry is the difficulty of finding adequate financing. Large companies keep abreast of their capital needs by plowing back earnings and supplementing their funds through securities flotations when necessary. But the proprietor of the so-called "small" business, even when he is willing to dilute his ownership to finance a volume level which is obviously more profitable, usually runs into a stone wall when he looks for risk capital.

Yet small businesses do grow, do find the means to finance increased volume, and often reach positions of considerable size and strength. In the last 25 years a constantly increasing number of them have turned to factoring as their principal source of financial support. In that time the annual volume of factored business in the United States has increased tenfold to more than $4,000,000,000, and factoring is employed in virtually every manufacturing field.

Despite this enormous rise of factoring, and its use by numerous distinguished firms in this country for generations, it remains a mystery to many otherwise thoroughly alert businessmen.

For this reason, RUBBER AGE has enlisted the coopeçation of William Iselin & Co., Inc., 357 Fourth Avenue, New York City, 150-year-old factoring company, in presenting a thorough explanation of this method of financing of which it is the oldest and largest practitioner in the United States.

What Is Factoring?

The factor does not supply risk capital as such. One of the principal objectives of the factor's service is to enable his clients to generate, from within their existing financial structures, the increased financial support they require.

Factoring is a method of financing which brings immediate cash payment to a manufacturer for goods sold on credit, guarantees him against credit loss on all merchandise sales, and relieves him of the entire chore of extending credit and collecting bills. Businesses which factor are usually manufacturers who sell their goods to processors, wholesalers and retailers.

The factor contracts to buy a client's accounts receivable for cash as soon as the client creates them by shipping his goods to a customer whose credit the factor has investigated and approved. The client sets the terms of sale, but no matter how long he has given his customer to pay, the cash proceeds are available to him from the factor from the moment he informs the factor he has shipped the order. When the customer has accepted the merchandise as satisfactory, the factor assumes the full risk for collection of the debt, with no recourse upon the client who has sold the goods.

The individual techniques of service may vary from factor to factor, but by and large the basic operating steps in factoring are these:

(1) Client notifies factor he has booked an order.

(2) Factor makes all necessary investigations of the customer's credit and reports promptly to client.

(3) Client ships order to the approved customer and sends him an invoice, with two copies to the factor. The invoice carries a printed legend telling the customer to pay the account directly to the factor.

(4) Factor credits the sale to the client's account at once.

(5) Client from that time can draw all or any part of the cash therefrom whenever he wishes.

Factoring

Once identified with the textile industry, is now used extensively in virtually every manufacturing field.

THE FACTORED MANUFACTURER derives the bulk of his financing from selling his existing or projected accounts receivable to his factor.

THE FACTOR buys his clients' receivables outright for cash, with no recourse upon them for collection, thus handling the entire credit function for his clients, including the making of all necessary inquiries, the keeping of receivables ledgers, and the full assumption of risk.

Financial Situation of Composite Rubber Footwear Manufacturer

TABLE I—IN OFF-SEASON

	Without Factoring	With Factoring
ASSETS		
Cash (or Due from Factor)	70,000	90,000
Accounts Receivable	60,000	
Inventory	100,000	100,000
Total Current Assets	**230,000**	**190,000**
Fixed Assets (Net)	48,000	48,000
Prepaid and Deferred	2,000	2,000
Total Assets	**280,000**	**240,000**
LIABILITIES		
Accounts Payable	70,000	30,000
Accruals	10,000	10,000
Borrowed Funds		
Total Current Liabilities	**80,000**	**40,000**
Net Worth	**200,000**	**200,000**
Total Liabilities	**280,000**	**240,000**
Working Capital	**150,000**	**150,000**
Current Ratio	**2.9 to 1**	**4.8 to 1**

TABLE II—IN ACTIVE SEASON

	Without Factoring	With Factoring
ASSETS		
Cash (or Due from Factor)	45,000	10,000
Accounts Receivable	300,000	
Inventory	380,000	380,000
Total Current Assets	**725,000**	**390,000**
Fixed Assets (Net)	48,000	48,000
Prepaid and Deferred	2,000	2,000
Total Assets	**775,000**	**440,000**
LIABILITIES		
Accounts Payable	175,000	80,000
Accruals	40,000	30,000
Borrowed Funds	360,000	130,000
Total Current Liabilities	**575,000**	**240,000**
Net Worth	**200,000**	**200,000**
Total Liabilities	**775,000**	**440,000**
Working Capital	**150,000**	**150,000**
Current Ratio	**1.3 to 1**	**1.6 to 1**

(6) Factor maintains accounts receivable ledgers and makes the collections from the client's customers.

As natural results of this association, factors point out the following:

(1) Factored manufacturers can sell their merchandise aggressively in expanded volume without risk of credit losses.

(2) Terms, dating and similar inducements which enable them to compete vigorously impose no burden on operating funds, and as their volume grows they generate through factoring a constantly increasing supply of liquid capital, instead of freezing more and more funds in support of receivables.

(3) Through accelerated working capital turnover, manufacturers have funds available as needed to meet their obligations promptly and earn their discounts; in many industries this saving frequently exceeds the cost of financing.

In addition to paying cash to clients for customers' orders actually shipped, factors also finance them by means of advances against projected sales. When a client's budget of operations for a forthcoming season indicates a need for funds currently, the factor provides the accommodation by letting him overdraw his account with the factor. In effect, the client collects immediate cash payment for future sales.

While these advance payments are made without maturity date, the client recognizes them as seasonal accommodations that are expected to be paid out seasonally. Usually they are made without security, but with the understanding that the client generally will adhere to his budget and will not make material changes in purchasing, production or shipping plans without prior consultation with the factor. The accommodation may be secured by inventory when the added protection of such collateral appears desirable, but the experienced, well-established factor places greater reliance on the safety afforded by an intelligent and careful study of the client's financial and budgetary controls and management qualities.

While factors are primarily short-term institutions, providing the bulk of their financial support through purchase of existing or projected accounts receivable, many of them, under certain circumstances, make longer-term loans to clients for plant expansion, equipment purchase, acquisition of other businesses, pay-out of estates, and other special needs.

Who Should Factor?

While there is a large segment of industry excellently suited to factoring, there are many types of businesses which a factor cannot serve or which would find little advantage in a factor's services.

The trade area which benefits from factoring includes firms expanding rapidly on limited capital, firms selling to customers who are unusual credit risks, firms facing unusual seasonal problems, firms whose capital has been reduced for various reasons but with the potential to maintain former volume.

On the other hand, there is little to be gained through factoring for a company which has no need of the factor's credit service and requires only nominal seasonal accommodation for brief periods to carry inventory and receivables at peak. Nor would a business selling only on very short terms or for cash, or selling only to a handful of top-notch firms, be likely to factor. In addition, factors themselves do not accept as clients service businesses, which do not sell a product, or firms whose customers are not recognized businessmen with formal credit ratings.

A prime example of a company which finds its natural financial ally in the factor is one in which, because of constant expansion, financing requirements beyond net worth are virtually of a permanent nature and periodic clean-ups with a bank are inconvenient for the client to meet. For a firm which, from the viewpoint of a commercial bank, is overtrading in relation to its working capital and net worth, factoring can provide an efficient instrument for cleaning up a long-standing bank loan and at the same time creating the foundation for comfortable financing of

Factoring is a method of financing which brings immediate cash payment to a manufacturer for goods sold on credit, guarantees him against credit loss on all merchandise sales, and relieves him of the entire chore of extending credit and collecting bills.

the same or possibly even larger sales.

To examine the impact of factoring on a specific business, the financial picture is presented here of a composite firm built on the experience of several actual companies in the highly seasonal rubber footwear industry. Table I shows the picture in the off-season, the time when manufacturers take stock of capital, products, ideas, organization, and set their course for the months ahead.

This manufacturer finds that he has much in his favor. He has a good line and knows how to merchandise it. He has built up a broad, aggressive sales organization. The trade likes his product and the service he provides. He is confident he can do $1,500,000 in the year. The one big question is, how can he support that substantial volume with his present capital, which means turning his working capital 10 times, his net worth 7½. Ratio studies of the entire shoe industry published by Dun & Bradstreet, Inc., put turnover for the top 25% of the firms covered at considerably less—only 7.04 times on working capital, 5.15 times on net worth.

In his drive to support $1,500,000 sales on the resources he possesses, the composite manufacturer will reach a point during his active season at which his position will be that shown in Table II.

This clearly indicates that without factoring the manufacturer is going to find it difficult, if not impossible, to get support to reach his $1,500,000 goal. His requirements will represent an unreasonable risk not only to the lender but to the manufacturer himself; at the time of this statement the people who are lending him money or selling goods to him on credit have almost three times as much money in his business as his own net worth. But with factoring his total indebtedness, even at peak requirement, is only 1.2 times his tangible net worth. The support he needs is well within his reach.

What of the profit on this volume? The Dun & Bradstreet study for the industry places the net profit for the top 25% of the firms represented at 3.34% of sales. If the composite firm outstripped these top firms in its industry so decisively in turnover of capital, it is reasonable to assume that it will at least equal them in the profit ratio, which, on sales of $1,500,000, would yield a net of $50,100.

Factors assert that only by factoring could this composite manufacturer reach his goal while keeping the risk of his own funds and those of his financial supporters within the limits of prudence, and simultaneously guaranteeing himself against the credit losses to which his considerable sales volume drive may well have exposed him.

The Factor's Credit Service

The matter of the credit service is one which often causes concern to companies considering the adoption of factoring; many of them feel that they would be giving the factor complete veto power over their sales, and thus curtailing their market. The actual effect, however, is just the reverse. The only way the factor can make money is by cashing the client's sales, and consequently the factor's main objective is to find a reason to approve the order, even make more credit available to the buyer, not veto it.

Extending credit to its clients' customers being virtually the factor's primary business, the factor has credit department manpower, facilities and contacts that few individual manufacturing firms can afford to maintain on their own; thus, the factor is far less likely than an individual seller to miss a reason for extending credit, if such reason exists at all. The factor, moreover, especially one of the major houses, has a far wider spread of risk than most individual manufacturers enjoy, and consequently can accept risk much more readily than its clients.

Bank Lines for Factored Firms

Another misconception about factoring is that a manufacturer cannot factor and have banking connections at the same time. The fact is that there are many situations in which bank and factor work hand-in-hand for the same client. For example:

(1) When the factor handles the client's accounts receivable on a maturity basis, with the bank supplying the financing. (Many companies which are adequately financed and can obtain ample accommodation from their banks make important use of the factor's credit service alone.)

(2) When the bank handles mortgage financing and the factor provides the current financing.

(3) When a factor invites the bank's participation in financing a client beyond the receivables, with bank loans against inventory or on open lines.

(4) When a hometown bank finds that requirements of a local client exceed the bank's legal lending limit, and the factor's participation may be more readily available or more desirable than that of another bank.

To the banker who knows that the factor is a strong, reliable house and has no recourse upon the client for collection of the receivables purchased, the "Due from Factor" item on the balance sheet is plainly a much sounder asset than the debts of hundreds or thousands of customers whose credit is little known to the bank.

Cost of Factoring

The cost of factoring consists of: (1) Interest for use of the factor's money, (2) A service fee, which is a small percentage of the client's net sales.

For the money the client draws from his account with the factor before maturity of the invoice involved, the factor charges interest until maturity date plus a nominal time for collection and clearance of checks. Thus the client pays interest to the factor only for the money he actually uses, and only for the exact number of days he uses it.

The service fee is negotiated in each case, in the light of the client's volume, the type of customer sold, terms of sale, and amount of bookkeeping the factor must perform in connection with the account. Offsetting this fee are the client's costs of operating a credit department internally, in addition to loss of management time, and losses due to bad debts.

Summary

To summarize, factoring well may be considered another technological instrument in the science of money management. An alert manager must know what it is, and how it works, just as he must understand every piece of equipment and every operating method which may aid him in the realization of his goal, and he must determine whether its cost is reasonable or not.

On this point he must be constantly alert to the fact that factoring cannot meaningfully be priced *per se*, but only in relation to a specific goal he will use it to attain. First he must determine the desirability of the goal, then ascertain whether and at what cost the necessary financing to enable him to reach this same goal with the same comfort, safety and efficiency can be obtained from other sources, against the same security, in the same economic cycle.

Sale of 40,000 Tons of Stockpile Rubber Planned

► An estimated $30 million worth of natural rubber is expected to be sold by the government out of the natural rubber stockpile, current reports state. The sale of 40,000 tons of rubber, to begin next spring, will be necessary if Congress approves a bill denying funds to replace replenishable materials that are sold for rotation purposes. The bill would also give the Administration authority to sell perishable materials from the stockpile without replacing them. Originally, $107 million was requested to continue stockpile operations. The Administration's request included money to rotate the 40,000 short tons of older rubber.

The House voted $33 million to run the stockpile, while the Senate approved $50 million. Later, a conference committee approved the $50 million to operate the Federal hoard of materials, but specified that none of this was to used for the rotation of rubber. It was stipulated that $17 million could be used for rotation of perishable goods, and this was earmarked for the rotation of perishable fibers and oils in the stockpile during fiscal 1960. The General Services Administration halted its stockpile rubber rotation program early in July, pending Senate action on the House amendment.

Congressional Order Not Final

The Congressional order is not final, but is expected to be before adjournment of the current session. If Congress refuses to appropriate rotation funds again next year, another allotment of rubber perhaps another 40,000 tons, must be sold to avoid loss through degeneration. Present action of the committees stressed to stockpile managers that at least a start should be made toward liquidation of the rubber stocks accumulated since 1945.

Disposal sales are expected to begin next spring under a plan now being drawn up by the Office of Defense Mobilization and other executive agencies. Although stockpile law requires Congressional approval of a strategic commodity sale, these agencies interpret the language of the appropriation bill to mean authorization of the rubber sale operation. At present, there are 1.25 million long tons of rubber in stock, valued at over $900 million. This total would be sufficient to fill industry needs in a five year moblization emergency. However, the stockpile program calls for only enough rubber for a three year emergency.

The Administration will send the disposal plan to Congress and withhold action for at least six months, the usual practice when stockpile managers unload "obsolete" materials from the government inventory. The rubber will be sold gradually under regulations requiring that stockpile disposals should not disrupt regular markets. No plans are being made now for the sale of other perishables.

Dairy Queen Cow Mattress

► A top attraction at the Michigan State University Farmers' Week is a pair of cows reclining on foam rubber mattresses. An Ohio firm displayed the bedding under the name "Dairy Queen Cow Mattress." According to the firm, the mattress is a time saver, eliminating the need for straw bedding. It also keeps the cows cleaner and more contented to increase milk production, the company claims.

Tire Plant in Turkey

► Societe Internationale Pirelli S.A., Basle, Switzerland, reports that the Government of Turkey has approved the application submitted by a group of industrialists for the construction of the first tire factory in that country. The application was submitted by representatives of private investors in Turkey together with Pirelli. A corporation has been organized with a capital of 45 million Turkish Lire and production is scheduled to begin sometime in 1960.

Keener Describes Injection of Carbon Black into Latex

► B. F. Goodrich Co., Akron, Ohio, has introduced a new method of injecting carbon black into rubber while the rubber is still in latex form. The new process was described by J. Ward Keener, president of Goodrich, at a meeting assembled to commemorate the 38,000,000th tire to roll off the production line at the company's Miami, Okla., tire plant.

"Carbon black," he said, "is actually a fine grade of soot derived from petroleum. As far back as 1912, B. F. Goodrich research discovered that addition of carbon black to tire tread rubber more than trebled tire wear. Now research has given us a process of incorporating carbon black into rubber that makes its abrasion-resistant qualities even more effective, and further extends tire wear."

According to Mr. Keener, injection of carbon black into synthetic rubber latex at the Goodrich-Gulf Chemical Co. synthetic rubber plants gives finer dispersion of the particles throughout the rubber, imparting greater uniformity and more resistance to tread wear. Goodrich-Gulf Chemicals, Inc., is jointly owned by B. F. Goodrich and the Gulf Oil Co.

Discusses Advantages

Discussing advantages of the new process, he said, "In effect, the development means that we may be able to do away completely with the handling, sorting, weighing, milling and mixing of 'bag black' with our rubber. In other words, we will make tire manufacturing a cleaner operation, at the same time improving tire quality."

Mr. Keener pointed out that tires coming out of a B. F. Goodrich plant in Oaks, Penna., have been successfully testing the new carbon black rubber for months. He called the new process one of a long line of scientific developments coming from this company's research that would mean lower cost to the consumer for increasingly better product service.

Better Sales Management Discussed At RMA Subdivision Annual Meeting

► "Blue Prints for Better Sales Management" was the theme of the annual meeting of the Molded, Extruded, Lathe-Cut and Chemically Blown Sponge Rubber Products Subdivision of the Rubber Manufacturers Association, which was held on June 25-27 at The Homestead, Hot Springs, Va. Fifty-five members, representing 33 rubber manufacturing companies attended the three day meeting. W. J. Blizzard (Firestone Industrial Products), chairman of the Subdivision, presided and introduced the first speaker of the program, W. James Sears, vice-president of RMA. Mr. Sears gave a talk on the "Political Responsibilities of Management", outlining the necessity for each and every individual present to keep abreast of political developments. He pointed out the need for knowing each one's representatives in Congress and emphasized the value of a letter to a member of Congress.

Group Dynamics Demonstrated

Dr. Kenneth B. Haas, one of the nation's foremost sales authorities and professor of the Department of Marketing at Hofstra College, was the next speaker introduced by Chairman Blizzard. Dr. Haas divided the group into workshop units, with 8 to 10 men at each table. He then had each table elect a chairman and a recording secretary, and proceeded to give a short demonstration in group dynamics which proved that problems within an industry could be solved by that industry. Polling the group as to length of service in the rubber industry, Dr. Haas found there was in excess of 1,000 years of experience in the rubber business represented. The basic problems that were proposed for discussion by the group were: New Application of Existing Products; Acquisition of Executive Personnel; Holding Down Expenses; Building Sales Personnel; Company Inter-Organization Communications; Deterioration of Rubber Products Due To Ozone; Reorganization; New Product Development; New Market Development; and How to Combat Rising Costs.

Dr. Haas briefed the workshop units on the importance of development of ideas; no negative remarks; quantity; free-wheeling; no critical remarks; and developing an idea from those proposed. Workshop Unit One, with Howard C. Sommer (General Tire) as chairman discussed "Company Inter-Organization Communications." Unit Two, under the chairmanship of R. A. Mertz (Ohio Rubber), discussed "How to Combat Rising Costs." "New Market Development" was the topic under discussion by Workshop Unit Three, under the chairmanship of H. W. Osburn (Stalwart Rubber). Workshop Four, with Pierce Sperry (Sperry Rubber & Plastics) serving as chairman, discussed "Acquisition of Executive Personnel." A. W. MacAlonan (Stalwart Rubber) headed Workshop Five's discussion on "Building Personnel in Connection with Reorganization Problems," and Workshop Six, with E. F. Doe (Pawling Rubber), as chairman, discussed the same problem.

After the workshop conclusions were summarized, Mr. Blizzard introduced Howard W. Smith (Pawling Rubber), who served as chairman of the panel discussion. The panel's topic was the recent RMA survey completed for the Subdivision on Salesmen's Compensation and Expense. The panelists and their subjects were E. F. Callanan (Clevite), "Salary Only"; R. G. Cox (Goodrich), "Salary and Bonus"; R. H. Davis (Cooper Tire), "Salary and Commission"; and H. M. Dyer (Acushnet), "Commission Only". The advantages of compensating through each method were discussed. Following the presentations by the panel members, those present were divided into workshop units to develop written questions for answer by the full panel at the beginning of the second day's session. L. R. Jacobs (Premier Rubber) and H. C. Dinmore (Tyer Rubber) joined the panel during the question and answer session.

Chairman Blizzard then introduced the first speaker of the second day's session, James A. Livingston, nationally syndicated business columnist and financial and business editor of the *Philadelphia Bulletin*. "Economic Outlook, 1959-1960" was the subject of Mr. Livingston's talk. He pointed out that business is good, almost too good, and the outlook is good, almost too good. He explained that the reasons for this optimism were that retail sales are excellent, people are spending, business is expanding and Wall Street is all-approving. Mr. Livingston suggested that we not be carried away by the current wave of optimism. A little common sense now will spare common anguish later. Prosperity will be prolonged in inverse ratio to our enthusiasm. He emphasized that we can prolong the boom by curbing ourselves and, thereby, it. A brief question and answer session followed Mr. Livingston's talk.

Missile Program Described

The next speaker introduced by Chairman Blizzard was Commander Robert J. Gutheim, a member of the immediate staff of the Assistant Director of Defense Research and Engineering for Strategic Weapons. Commander Gutheim described the missile program and projects that were currently in development, refinement and production. He distributed information on general procurement and released some basic information as to the approach to be taken by those members interested in Government contracts or sub-contracts. Commander Gutheim also presented a film "On Target" taken at Cape Canaveral, Fla.

Before calling the business meeting to a close, Chairman Blizzard informed the group that Charles C. Miller (RMA), who was scheduled to give a talk on "Meeting the Challenge of Imports", was ill, and copies of the talk were distributed.

The annual dinner of the Subdivision was held on Thursday, June 27. During the dinner, Ross R. Ormsby, president of RMA, presented an award to Mr. Blizzard in appreciation of his services to the Subdivision as chairman over the past two years.

Ross R. Ormsby (left), president of the Rubber Manufacturers Association, presenting a sterling silver tray to Walter J. Blizzard (right) in appreciation of his service to the RMA Subdivison on Molded, Extruded, Lathe-Cut and Chemcally Blown Sponge Rubber Products.

Dow Corning Names Three

► Dow Corning Corp., Midland, Mich., has announced that William W. Pedersen, manager of its Cleveland sales office, has been transferred to its main office in Midland and becomes a full-time member of a new corporate planning committee reporting to the company president. Max H. Leavenworth, manager of the firm's Southwestern branch in Dallas, Texas, has been named manager of the Cleveland sales office, while Edwin Haire of the Dallas office will succeed Mr. Leavenworth as Southwestern manager. Mr. Pedersen received his B.S. and M.S. degrees in chemical engineering from the University of Louisville. He worked for the Dow Chemical Co. from 1938 to 1945, when he joined Dow Corning. He has been head of the Cleveland branch office since it was established in 1946. Mr. Pedersen is a member of the American Chemical Society and the Cleveland Sales Executives Club.

Mr. Leavenworth holds a B.S. degree from Eastern Michigan University. After considerable teaching experience, he joined Dow Corning in 1945. He specialized in Class H insulation before being named manager of the Southwestern branch in 1948. Mr. Leavenworth is a member of the American Chemical Society, the American Institute of Electrical Engineers and the Dallas Sales Executives Club. Mr. Haire received his B.S. degree in 1939 from Western Michigan University. During World War II, he served in the United States Navy. In 1951 he received his masters degree from Wayne State University. He was associate professor of mathematics at Lawrence Institute of Technology before joining Dow Corning in 1952. Mr. Haire is a member of the Society of Aircraft Materials Process Engineers, the Society of Plastics Engineers and the Southwest Ceramics Society.

U.S. Rubber Creates New Position

► U. S. Rubber Co., New York, N. Y., has announced the creation of a new position of research associate at its Wayne, N. J., Research Center. According to the company, the purpose of the new position is to further encourage scientists whose main interest is independent creative research. The company also announced that four Research Center scientists and engineers have been promoted to the new position in recognition of their outstanding ability to do independent creative research. The new research associates are Dr. Sheppard A. Black, Dr. Fitzhugh W. Boggs, Dr. Philip D. Brass and Dr. Eugene M. McColm. The research associates will be on the same organization level as department managers. Other scientists and engineers are expected to be named research associates in the future, the company states.

Personnel involved in the creation of two new sales departments by the Chemical Division of the Goodyear Tire & Rubber Co. include (top row—left to right): W. E. Kelly, L. P. Thies, L. E. Stanton, and (bottom row), R. W. Williams, J. Platner and J. D. Hunter.

Goodyear Realigns Sales Departments

► Chemical Division of the Goodyear Tire & Rubber Co., Akron, Ohio, has established two new sales departments including the Polyester Products Department and the Adhesives Department. The new departments were formed to allow the division to coordinate more fully its sales efforts and services to the polyester and adhesives fields. L. P. Thies, former head of the division's Detroit office has been named manager of the Polyester Products Department, while W. E. Kelly, former manager of the St. Louis office, has been named head of the Adhesives Department.

In other staff changes, L. E. Stanton, former district manager at Houston, has been transferred to Detroit as district manager; R. W. Williams, previously senior sales representative on the West Coast, has been appointed West Coast district manager; J. Platner, former senior sales engineer in the Rubber and Rubber Chemicals Department, has been appointed district manager at Houston; and J. D. Hunter, former senior sales representative in the division's Chicago office, has been transferred to the St. Louis office as district manager.

Mr. Thies joined Goodyear in 1956 with extensive experience in the fields of vinyl plastisols and industrial finishes. He was first assigned to the Cleveland office and was made district manager at Detroit in 1958. Mr. Kelly, who had previous experience in textile and adhesive sales, joined Goodyear in 1949. He served at the Chemical Division's New York office until 1954, when he was transferred to the St. Louis office as district manager. Mr. Stanton joined Goodyear in 1954 with previous experience in the rubber and chemical industries. He was assigned to Houston as a special representative and appointed district manager there in 1958.

Mr. Williams joined the Division in 1953 as a special representative and transferred to the Portland office soon afterwards. Mr. Platner became associated with Goodyear in 1947, was assigned to the Research Division in 1948 and the Chemical Division in 1953. He was senior sales engineer in the Coatings Department until being transferred to the Rubber and Rubber Chemicals Department early this year. Mr. Hunter has been with the company since 1953. Experienced in the fields of research and development, he was assigned to the Chicago district.

Chicago Group Meets; Announces New Officers

► The Chicago Rubber Group presented diplomas to 16 graduates, who had successfully completed its course in rubber technology, at a meeting on April 24 at the Furniture Club in Chicago, Ill. Over 175 members and guests attended the meeting which featured the recognition of Ben W. Lewis (Witco Chemical), as one of the original founders of the Chicago Rubber Group. Maurice J. O'Connor (O'Conner & Co.) group president, presented Mr. Lewis with an engraved desk set. Walter H. Peterson (Enjay) was honored with an honorary life membership in the Chicago Rubber Group on the tenth anniversary of his service as president of the group. Guest speaker for the meeting was Dr. Maurice Morton, director, Institute of Rubber Research, and professor of polymer chemistry at the University of Akron, who spoke on "Basic Research—A Natural Resource."

The 16 graduates who received their diplomas were: William P. Anderson (Richardson Co.); Arthur Der Avedisian (E. C. Jacobson Co.); Donald Bahnick (Roth Rubber); William R. Dunlop (Richardson Co.); Robert L. First (Asphalt Corp. of America); Joseph C. Tzzo (Mayfair Molded Products); Richard E. Lamb (Waukesha Rubber); Jack K. Lindenberg (Flexan Corp.); Robert E. Pajor (Richardson Co.); Alejandro Perez (Felt Products Mfg.); Lawrence E. Read (Asphalt Corp. of America); William J. Retzler (Chicago Rubber Co.); Michael Vivo (Richardson Co.); Charles Wood (Flexan Corp.); and Robert G. Weisz (Amoco Corp.).

Maurice J. O'Connor (O'Connor & Co.) president of the Chicago Rubber Group, presents an engraved desk set to Ben W. Lewis (Witco Chemical), one of the original founders of the Chicago Rubber Group.

The results of the annual election of officers were announced to the membership. The 1959-1960 officers of the Chicago Rubber Group are: *President,* John Groot (Dryden Rubber); *Vice-President,* Stanley F. Choate (Tumpeer Chemical); *Secretary,* Theodore C. Argue (Roth Rubber); *Treasurer,* Russell A. Kurtz (DuPont); *Directors,* Irwin O. Nedjl (Ideal Roller & Mfg.). Frank E. Smith (Williams-Bowman Rubber), Dick Huhn (Harwick Standard), John C. Ross, Jr. (O'Connor & Co.), and Stan D. Shaw (Witco Chemical).

Akron Polymer Lecture Group Announces 1959-1960 Program

► The Akron Polymer Lecture Group, Akron, Ohio, has announced its program for the 1959-1960 season. Eight meeting dates have been set, and the lectures will be held in Room 107, Knight Hall, University of Akron, beginning at 8:00 p.m. The lecture program and schedule is: October 2—"The Mechanical Strength of Polymers" by Bernard D. Coleman (Mellon Institute); November 6—"How Tires Wear" by A. Schallamach (British Rubber Producers' Research Association); December 4—"Stereospecific Polymerization of Acrylic Monomers" by W. E. Goode (Rohm & Haas); January 8, 1960—"Recent Advances in Polymerization by an Alternating Intra-Intermolecular Mechanism" by George B. Butler (University of Florida); February 5—"Organo-Tin Polymers" by Juan C. Montermoso (Quartermaster Research & Engineering Command); March 4—"Epoxy Polymers" by S. O. Greenlee (Greenlee Research); April 1—"The Effects of Radiation on Polymers" by Oscar Sisman (Oak Ridge National Laboratory); and May 6—"Progress in Polymer Synthesis and Application" by Herman Mark (Polytechnic Institute of Brooklyn).

Inquiries regarding the meetings should be addressed to John L. Binder, Program Chairman, Akron Polymer Lecture Group, Chemical and Physical Research Laboratories, Firestone Tire & Rubber Co., Akron, Ohio.

Nonox ZA Offered in U. S.

► Imperial Chemical Industries, Ltd., England, has announced that Nonox ZA, a rubber anti-ozone chemical, is now available in the United States through Arnold, Hoffman & Co., Inc., Providence, R. I., the company's United States subsidiary. Nonox ZA (p-isopropylaminodiphenylamine) is said to give a very high degree of protection against ozone attack and flex-cracking, while conferring heat resistance comparable to the best anti-oxidants.

Since it is effective in both static and dynamic conditions, the material is expected to find use in mechanical goods, belt, wire and cable, and many general sections of the American rubber industry as well as in the tire industry. Nonox ZA is a deep purple solid with a minimum crystallizing point of 70° F. Marketed as a dustless flake, it disperses readily in the mill or Banbury. It is a staining-type anti-ozonant and therefore, is not recommended for light stocks or for applications where there is a possibility of migration to light-colored materials.

DuPont Promotes Jilk

► Dr. Lawrence T. Jilk, assistant manager of the Planning Division for the Polychemicals Department of E. I. du Pont de Nemours and Co., Inc., Wilmington, Del., has been named manager of the newly created Planning Division of the Elastomer Chemicals Department. A native of Winona, Minn., Dr. Jilk was graduated from the University of Minnesota in 1934 with a B.S. degree in chemical engineering and three years later received a Ph.D in chemical engineering at the same university.

Dr. Jilk joined DuPont as a chemical engineer at the company's Belle, West Va., works in 1937 and became a group leader at the Belle Works in 1940. In 1945, he was made a superintendent in the technical section there; was appointed manager of the technical section at the Sabine River works in 1946; and was transferred to the Wilmington office as assistant manager of the plant's technical section in 1950. In 1953, he became assistant manager of the Planning Division.

Parker-Hannifin Buys Plant

► Parker-Hannifin Corp., Cleveland, Ohio, has announced plans to purchase a plant in Lexington, Ky. The new facility, until recently owned and operated by the Kawneer Co., Niles, Mich., was built in 1946 to produce sheet metal products for the building industry. The plant has approximately 50,000 square feet of manufacturing space, all on one floor. The plant will be operated by the Parker Seal Co., a division of Parker-Hannifin. According to the company, the continuing growth in demand for the broad line of gaskets, packing and seals made by the division has exceeded the fabricating capacity of plants now operating for this purpose in Berea, Ky., Los Angeles and Culver City, Calif.

Ace Rubber Names Reuben

► Ace Rubber Products Inc., Akron, Ohio, has announced that Harold Reuben, previously chief chemist, has been named factory and technical manager. Mr. Reuben holds a degree in chemical engineering from Ohio State University and an M.S. degree from Cornell University. He joined Ace Rubber in 1956, and has helped enlarge the firm's research and testing laboratories.

Quebec Rubber Group Elects 1959-60 Officers

► The Quebec Rubber and Plastics Group elected its 1959-1960 officers at a meeting on June 25, at the Queen's Hotel in Montreal, Quebec, Canada. Elected and appointed to Group offices were: *Chairman,* O. R. Huggenberger (Dominion Rubber); *Honorary Chairman,* F. Ditchburn (Bate Chemical); *Secretary,* L. V. Woytiuk (Northern Electric); *Treasurer,* A. Holden (Canada Colors & Chemicals); *Speaker Committee Chairman,* J. M. Campbell (Northern Electric); *Chairman Fall Stag,* A. R. Overing (British Rubber); *Chairman Ladies' Night,* R. Suksi (Sun Oil); *Chairman House Committee,* K. McCabe (Monsanto Canada); *Chairman Golf Committee,* L. Farquhar (Shell Oil); *Publicity Chairman,* A. S. MacLean (Dominion Rubber); *Chairman Education Committee,* G. L. Bata (Carbide Chemical); *Chairman Constitution and Special Duties,* W. M. Schwenger (DuPont Canada); *Chairman Membership Committee,* W. L. Leach (Cabot Carbon of Canada); and *Member at Large,* W. R. Touchie (Kingsley & Keith).

Golf Outing

Over 100 persons attended the golf outing held by the Quebec Rubber and Plastics Group on June 5, at the St. Hyacinthe Golf Club. Carl Croakman (Columbian Carbon Canada) was the winner of the Bob Dickson trophy for low gross. Albert Moreland (Kingsley & Keith) was the low net winner under the Atlantic Handicap System. The Territorial Championship between the Maritime Bluenoses, Quebec Lillies, Ontario Hogs, Western Gophers and the Foreign Legion, was won by the Quebec Lillies. Receiving individual trophies were the top four men: Jeff Wright (BA-Shawinigan Ltd.); Bob Murray (Canadian Industries); Gil Vedda (Crown Diamond Paint); and Cy Wagner.

Bill Touchie (Kingsley & Keith) served as golf chairman, and he was assisted by Bill Blundell (Dominion Rubber), Rolly Dupuy (Durham Industries), and Al Canavan (Kingsley & Keith).

Hodag Opens Facility

► Hodag Chemical Corp., Chicago, Ill., has announced the completion of construction of its enlarged production, laboratory and office facilities. According to Hodag, the new quarters will allow the company to handle the increasing demand by industrial users for its line of antifoams, esters, emulsifiers, flocculating agents and other surface-active chemicals. The new facilities include stainless steel blending tanks and a sonic homogenizer for the manufacture of silicone antifoams and other silicone products.

Milo J. Marsh, newly appointed president of Ohio Rubber.

Named President of Ohio Rubber

► Milo J. Marsh has been appointed president of Ohio Rubber Co., Willoughby, Ohio, a division of Eagle-Picher. He succeeds Brigadier General Hermon F. Safford, who retired on September 1. Mr. Marsh was educated at Creighton University and Columbia University. His experience includes store managerships with R. H. Macy & Co. and Sears, Roebuck & Co. In 1940, he was employed by the British Purchasing Commission with responsibility for procurement and production of small arms ammunition in the United States. During World War II, he served as a civilian executive in the Office, Chief of Ordnance, Washington, D. C., as chief of the Central Planning Section. In this capacity he was in charge of production scheduling, raw material control and expediting for the Manufacturing Division of Army Ordnance.

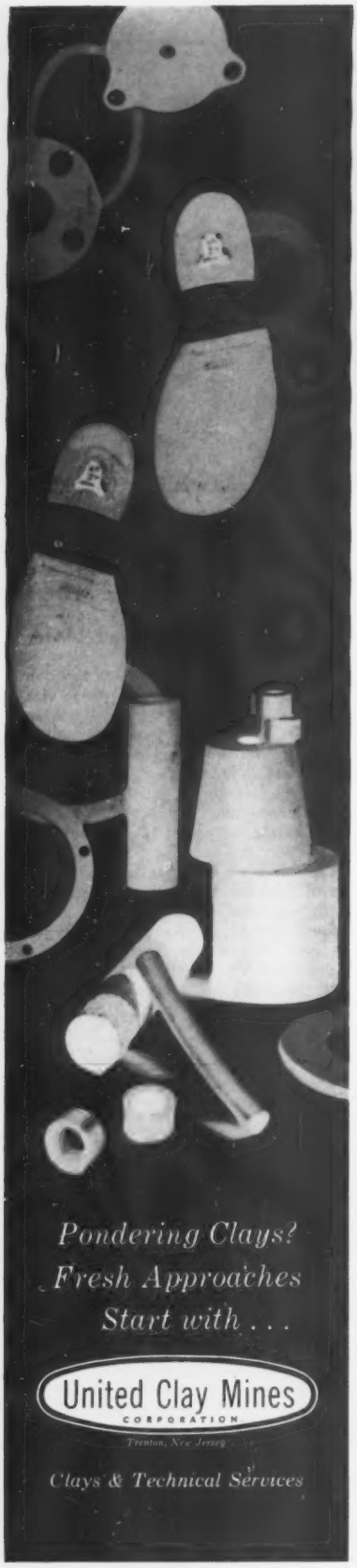
Mr. Marsh joined Ohio Rubber in 1946 as assistant to the executive vice-president. He became vice-president and assistant to the president in 1953. In 1954, he was named executive vice-president. During the Korean campaign he served the Chief of Ordnance as a consultant. Mr. Marsh is a member of the American Management Association and serves on that organization's Finance Planning Council. General Safford has been president of Ohio Rubber since 1951. He retired from the U. S. Army in 1946 and joined Ohio Rubber as executive vice-president. Mr. Marsh was made a director in 1949 and has been a director and vice-president of Eagle-Picher since 1953.

Grace to Acquire Hatco Chemical

► W. R. Grace & Co., New York, N. Y., and the Hatco Chemical Co., Fords, N. J., have reached an agreement under which Grace will acquire the business and assets of Hatco in exchange for 126,000 shares of Grace common stock, plus possible additional shares depending on the future earnings of Hatco. At the final quotation of 47½ for Grace on June 18, the aggregate market value of the 126,000 shares would be $5,985,000. Hatco, whose business consists primarily of the production of esters and synthetic lubricants for jet engines, will become a division of Grace. No changes in present manaegment and policies are contemplated.

Adding Vinyl Coated Materials

► Reeves Brothers, Inc., New York, N. Y., has announced that it is adding vinyl coated materials to its Vulcan Coverlight line. The present line includes Coverlight-N, a neoprene coated nylon, and Coverlight-H, a Hypalon coated nylon. The new vinyl coated Coverlight will be manufactured at the firm's Grace plant in Rutherfordton, N. C. Reeves reports that the plant, a former cotton mill, is being reactivated and renovated for this purpose, and special production equipment and laboratory facilities are being installed. The company also announced that D. E. Sherrill, plant manager of Buena Vista, Va., plant, will also be plant manager of the new facility.



Officers of the Akron Rubber Group, Inc., for the 1959-1960 season. They are, left to right: *Vice-Chairman*, Irvin J. Sjothun (Firestone); *Chairman*, Milton H. Leonard (Columbian Carbon); *Treasurer*, Charles W. Stalker (General Tire); and *Secretary*, John H. Gifford (Witco Chemical).

Akron Group Sets 1959-60 Program

► The Akron Rubber Group, Inc., has announced its meeting program for the 1959-1960 season. On October 23 the Group will hold an afternoon technical symposium on "Tires for Today", at the Sheraton Hotel in Akron, Ohio. Guest speaker for the evening session will be Dr. R. C. S. Young of the Speakers Bureau of General Motors. The first dance to be sponsored by the Akron Rubber Group will be held on November 6.

The first meeting of 1960 will be held on January 29 at the Sheraton Hotel in Akron. An afternoon technical symposium will discuss "Materials Handling" and the evening session will feature a guest speaker to be announced at a later date. "Retread and Repair Materials" will be the subject of the afternoon technical symposium on April 8, 1960, while the guest speaker for the evening session will be announced later.

Dow Vinyl Copolymer Latex

► Development of a new vinyl copolymer latex which is said to have exceptional heat and light stability has been announced by the Dow Chemical Co., Midland, Mich. Designated Experimental Latex X-2726, the material is designed to be of use in many textile coating applications. According to Dow, performance tests in specific conventional exposures have shown the heat stability of the new material to be 50 per cent better than the best commercial vinyl chloride type latices previously available. Exposures of Experimental Latex X-2726 in an Atlas Fadeometer have shown improved light stability by a 20-30 per cent margin.

In addition, the new latex is reported to have broad compatibility with plasticizers and other film forming latices and may be fused at lower heat than competitive unplasticized latices. Among the applications for which Experimental Latex X-2726 is said to show promise are coatings for shade cloth, wall-board, rubber, book fabrics, foldable table coverings, fabric wall coverings, and in linoleum wear layers.

Adhesive Rubber Sheeting

► B. F. Goodrich Industrial Products Co., Cleveland, Ohio, has developed a new abrasion-resistant adhesive rubber sheeting that can be applied to metal, concrete, wood and other materials almost as easily as a cold patch to an inner tube. According to the company, the sheeting, called Amorline, does not require expensive tools or special skills to cover or patch equipment. The material, made from a rubber compound, considerably outlasts steel of the same thickness, the company states. Goodrich recommends Amorline as a cover to protect against abrasion of chutes, launders, hoppers and grain spouts.

DuPont Promotes Johnson

► K. E. Johnson, formerly group leader, has been promoted to technical supervisor at the Fairfield, Conn., plant laboratory of E. I. du Pont de Nemours & Co., Inc. Mr. Johnson succeeds W. Stewart Gocher, who has retired after 34 years of service.

AIEE Hears Talk on Neoprene in Wire and Cable Industry

► The growth and status of neoprene in the wire and cable industry was discussed by C. E. McCormack in a paper entitled "Twenty Years' Experience with Neoprene in the Wire and Cable Industry," which was recently presented before the Middle Eastern District meeting of the American Institute of Electrical Engineers at Baltimore, Md. According to Mr. McCormack, the success of neoprene has depended not only on the inherent characteristics of the polymer, but to a large extent on the ingenuity of cable manufacturers in designing compounds and cable constructions and on the many end users who cooperated in its long term evaluation.

Neoprene was first manufactured at DuPont's Chambers Works plant in Deepwater, N. J., and since that time, facilities for its manufacture have been increased steadily. Wire and cable, the largest single application for the material, presently accounts for 25 to 30 per cent of total production. Neoprene cable compounds contain from 40 to 60 per cent neoprene. Other ingredients including fillers, plasticizers, vulcanizing agents and antioxidants are blended into the raw neoprene in large internal mixers.

Following a careful quality check of the mixed batches, the neoprene compound is, in most cases, extruded onto the cable. The strip insulating process, wherein strips of neoprene compound are folded around the insulated conductor or cable core, is another important method, the author stated. Another variation is the application of neoprene tapes with conventional taping machines. The material may be vulcanized in a horizontal or vertical continuous vulcanizer; by the lead press method; or by coiling uncured cable in a circular pan containing talc and then placing in a steam autoclave at relatively low pressures.

While all neoprene compositions possess certain inherent properties, the fullest development of these properties for specific applications depends on the type of compounding. There is no all purpose neoprene compound. Cable manufacturers have developed formulations for each specific application, which are subject to modification as development work continues.

Neoprene closely resembles natural rubber in many of its important mechanical properties, Mr. McCormack said. Probably the most noteworthy is the similarity in resilience or ability to recover quickly from deformation either in compression or extension. It also compares favorably in tensile strength, elongation, set abrasion resistance and tear strength. Neoprene has good mechanical properties at operating temperatures as well as at emergency temperatures as high as 500°F., which is important in its performance in many types of wire and cable.

The author discussed some of neoprene's important properties in the construction of wire and cable including flame resistance; low temperature resistance; ozone and corona resistance; chemical, acid and alkali resistance; heat resistance; and water resistance. The electrical properties of neoprene, he said, while inferior to most commonly used insulating materials, are sufficient to permit its use as an insulation in a number of applications involving 60 cps and voltages under 600.

The paper was concluded with a description of neoprene's use in various types of wire and cable including flexible cord; automotive wire; telephone wire; weatherproof wire; A. C. secondary network cable; portable power cable; stationary power cable; protective coverings for lead sheathed power cable; control cable; and aerial cable.

Allied Makes Executive Changes

► Allied Chemical Corp., New York, N. Y., has announced changes at the top executive level with the chairman now designated as chief executive officer. Previously, the president had been chief executive officer. Kerby H. Fisk, formerly chairman of the board and of the executive committee, has been named chairman and chief executive officer. Harry S. Ferguson, previously executive vice-president and a member of the executive committee, has been appointed chairman of the executive committee and chief administrative officer, and Chester M. Brown, formerly vice-president of the corporation and president of the National Aniline Division, has been named president and chief operating officer. Each of the officers is a director and will also be a member of the executive committee. The changes become effective in September, when Glen B. Miller, president, reaches the normal retirement age of 65.

Plant On Stream

► Texas Butadiene & Chemical Corp., New York, N. Y., has brought on stream, at its plant near Channelview, Texas, facilities for the recovery of propylene, a raw material used in the manufacture of petrochemicals and high octane gasoline blending components. According to the company, the unit is the first to recover propylene in the effluent from the Houdry butane dehydrogenation process utilized by the company in the production of butadiene and butylenes. The propylene, which is recovered in 80 per cent minimum concentration, will be supplied to other petrochemical producers or used as feedstock to its own aviation alkylate operation, the company states.

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SAE-ASTM Committee Reports

► The SAE-ASTM Technical Committee on Automotive Rubber reports that a complete reorganization of all cellular elastomers as they appear in SAE 10R and ASTM D-735 is in the offing. At a recent meeting, members agreed that the three types of foam and sponge, namely rubber, vinyl and urethane, should not be lumped together in any nomenclature system nor should they be tested by the same methods. The Committee also reports that 220 grades of rubber needed by the Department of Defense are being incorporated into a new master rubber specification which combines both the SAE 10R and ASTM D-735 requirements.

Committee members also approved a reduction in the time requirement for the elastomer compound compression set test. It is now 22 hours as compared to the previous 70 hours. In doing so, they pointed out that the new specification format would enable any consumer to specify a 70 hour test, if so desired, by means of a suffix number. Selection or development of test methods for determining stress relaxation of elastomer compounds plus the assignment values for incorporation in ASTM D-735 tables, form the scope of a new Committee subsection. Under the chairmanship of Dr. Philip Weiss (General Motors), the effects of time and temperature on stress relaxation will be investigated.

Cabot Moves Offices

► Godfrey L. Cabot, Inc., has moved to new home office headquarters at 125 High Street, Boston 10, Mass. The new offices are designed for greatest comfort and efficiency, with all offices equipped with combination prismatic lens and diffuser panel lighting which gives even light in all areas. Circulating air-conditioning can be controlled to individual preference in each office. Some of the features of the layout include a directors' room, a large conference room equipped with ground glass screen for showing films and slides from a projection booth in the rear of the room. Other smaller conference rooms are conveniently located. This location will be the home office headquarters for all Cabot interests.

Firestone Gives $1,050,000

► Firestone Tire & Rubber Co., Akron, Ohio, has given $1,050,000 to the California Institute of Technology for the building of the Firestone Aeronautical Research Laboratory. The new laboratory will be used for a variety of aviation research, with emphasis on missiles and rocketry. L. A. DuBridge, president of Caltech, reports that the Firestone grant brought to $16,500,000 the total fund being raised for the building of the research center, which will cost an estimated $19,000,000.

Frank N. Kelley

Wins RUBBER AGE Award

► The 1959 RUBBER AGE Award of $100 has been presented to Frank N. Kelley for the preparation of an outstanding master's thesis in rubber chemistry. Mr. Kelley's thesis was entitled "Network Formation Between Difunctional Linear Polymers and Trifunctional Reagents." Currently, he is working as a research chemist on a Goodyear fellowship at the Goodyear Tire and Rubber Co. Research Center in Akron. He will begin work on his doctorate at Akron University this Fall and hopes to receive his degree in 1961.

Mr. Kelley received a Bachelor of Science degree in chemistry from the University of Akron in 1958 and a Master of Science degree last June. As an undergraduate at Akron University, he was active in many organizations including Omicron Delta Kappa, national men's activities honorary (president); Alpha Chi Sigma, national chemistry honorary (president of the collegiate chapter and president-elect of the Akron professional chapter); president of Student Council, 1957-58; Arnold Air Society, National advanced Air Force ROTC honorary; and Wing Commander (Cadet Colonel) of Akron University's Air Force ROTC detachment.

Rokeach Buys Eastern Foam

► I. Rokeach & Sons, Inc., New York, N. Y., has acquired the Eastern Foam Fabric Co., Inc., Oceanside, N. Y., manufacturers of foam rubber products for the apparel industry. According to a company spokesman, Eastern Foam will be operated as a wholly owned subsidiary of Rokeach. The acquisition was achieved by an exchange of stock. The purchase price entailed about $425,000.

Realigns Sales Department

► Disogrin Industries, Inc., Mount Vernon, N.Y., has announced the creation of two separate and distinct sales divisions—the Disowheel Division and the Disogrin Products Division. According to the company, the Disowheel Division will be responsible for the sales of Disowheel and the servicing of Disowheel customers. The Disogrin Products Division will be in con- of all applications and sales of Disogrin products other than Disowheel. The company also has announced that Joseph A. Gagen has been named manager of the Disowheel Division, and Kenneth H. Grim has become manager of the Disogrin Products Division.

Mr. Gagen joins Disogrin after 17 years experience selling industrial wheels and tires. He formerly was with the New York City branch of Clark Equipment Co., where he was manager of the Industrial Wheel and Tire Division. Mr. Grim, a graduate engineer, has had vast experience in industrial sales engineering. He formerly was with the M. W. Kellog Co. and the Combustion Engineering Co.

Buffalo Holds Golf Outing

► The Buffalo Rubber Group held its annual golf outing on June 9, at the Lancaster Country Club in Buffalo, N. Y., with 132 members attending. The trophy winners for low gross were W. E. Harris (General Electric) and J. J. McQuire (Franklin Refining). Low net honors went to Phil Lawrence (Goodrich Chemical), and the runnerups were Robert Prior (Hewitt Robins); Emery E. Slaght (Stanley Chemical); Ralph Weaton (St. Joseph Lead); E. J. Helmbrecht (Hewitt Robins); Harold Green (Dunlop Tire); F. Morrow (Dunlop Tire); M. H. Hicky (Hewitt Robins); J. B. Kelly (Hewitt Robins); C. Monochina (Dunlop Tire); and F. A. McGrath (Ashland Oil & Refining).

John T. Frankfurth (U. S. Rubber Reclaiming) won the dubious honor of having lost most golf balls. The winners of an egg throwing contest were Jack Haller (Allied Chemical) and Jim Rogers (Union Carbide). The hole-in-one tournament was won by John Snyder (Columbian Carbon) and Bob Kerwin (Globe Woven Belting).

Associated Gaskets Moves

► Associated Gaskets, Inc., Bridgeport, Conn., has established its offices at the firm's new plant on Riparian St., in Bridgeport. According to Victor J. Castaldo, president, the new quarters will enable the firm to meet an expanding volume of orders for molded, extruded and die-cut parts for industry. The company manufactures rubber parts for aviation, missiles, electronics and other industries.

Polymer Journal Founded

► Butterworths Scientific Publications, London, England, has announced that the first issue of its new quarterly journal *Polymer*, will make its appearance in October 1959. According to Butterworths, *Polymer* was founded to provide an international medium for the publication of original papers on the chemistry, physics and application of polymer research, and on other disciplines which contribute to the development of polymer science.

The publishers feel that a very substantial research effort is now devoted to the polymer field, and the number of papers written has become so large as to justify a new vehicle for their publication. A feature of the journal will be the publication of short communications dealing with work which merits publicity before a full paper can be prepared and published. The advisory editorial board of *Polymer* consists of: Dr. C. H. Bamford (Courtaulds Ltd.); Prof. C. E. H. Brown (University of Liverpool); Prof. Geoffrey Gee (University of Manchester); and Dr. Rowland Hill (I.C.I. Fibres Division).

N. J. Zinc Increases Sales Staff

► New Jersey Zinc Co., New York, N. Y., has announced a further extension of its representation in the zinc and titanium pigment consuming fields, with the appointment of four members to its sales staff in the Middle West and West Coast areas. Harold R. Frasure has been named representative in Cincinnati, Ohio, and will also cover Columbus and Dayton, Ohio, and Indianapolis, Ind. Stanley E. Moore has joined the Chicago sales office and his territory will include the Minneapolis-St. Paul, Minn., area. John B. McCarthy will make his headquarters at the Los Angeles sales office. Walter E. Menhinick, formerly a member of the Chicago office, has been transferred to St. Louis. He will also cover the Kansas City and Louisville areas.

Retires from Davis-Standard

► Benjamin H. Davis has retired from active management participation in Davis-Standard Corp. and the Standard Machinery Co. of Mystic, Conn. He will continue as a consultant to the two firms. Mr. Davis, well known in his field and the holder of many patents joined the Standard Machinery Co. in 1948 to develop its plastic and rubber extruding equipment and wire machinery lines. When Davis-Standard was formed to handle the sales of Standard Machinery's products, he was made its operating head and has continued in this capacity. Both companies merged in 1956 with Franklin Research Corp. of Boston and now function as divisions of the Boston firm. Mr. Davis became a vice-president and director of Franklin at that time.

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Product Research and Development—A few years ago Snell was retained to develop new products, applications, and markets for sugar. Extensive research and development work by Snell resulted in the creation of a new synthetic detergent—based on *sugar!*

Product Application—A Snell client in the paper industry, for whom we had developed a fine additive, wanted to explore uses in other fields. Unfortunately, their highly qualified staff's experience was limited to the one field. Snell, with experts in practically every product field, found the new product has potentialities as both a good emulsifier and a paint plasticizer. Only the very largest manufacturing companies can duplicate the breadth of experience and background the Snell "brain-trust" of technical experts can offer you!

Product Improvement—One Snell client found their product, an adhesive bandage, slipping in quality. Tape was going gooey in storage on druggists' shelves. Snell research helped this client bring his product quality up to equal the best on the market, and retain his share of sales.

Product Evaluation—A Snell brewery client wanted to expand production and take advantage of a more efficient production technique but feared the taste of the beer might suffer. Snell food technologists, taste panels, and engineers checked the new process and hundreds of samples of beer made under new and old systems, recommended the switch to the more profitable modern process. The change went unnoticed by the customers, and sales continued to climb.

Market Research—A Snell client with a waste product had briefly considered building a plant to use it to manufacture another product; but had given up after their own brief survey showed the new product to be already overproduced. When they consulted Snell for checking, however, Snell predicted there would be a shortage within three years. The client waited two years, built the plant—and now has a profitable new product instead of a waste!

Toxicology—One of the largest frozen food companies began getting complaints on the flavor of one of their green vegetables. Since hundreds of thousands of dollars were at stake, they consulted Snell to find out what was wrong. Snell by analyzing tests, and checking on the farm, was able to prove that the taste—actually toxic—was due to a new type of insecticide sprayed on the fields hundreds of yards away on a windy day long before the harvest!

Engineering—A large midwestern firm desired to produce its own brand of instant coffee, to possess outstanding flavor, body, and bouquet. They engaged Snell to design their extraction line, which is now economically producing a superior product, and have since doubled capacity. Since that time, two additional plants have been modified under our supervision to increase production and improve product characteristics.

What's Your Product Problem?—Whatever it is, and whatever your product field—chemicals, chemical specialties, personal products, pulp and paper, protective coatings, plastics, textiles, foods, petroleum, rubber—Snell has men who "know the score" in that field, and who can work with you creatively and profitably in developing, producing, protecting, and marketing new ideas. This broad experience can be decisive in protecting not only your ideas, but also the thousands of dollars you spend developing them. And the cost of Snell service is less than you might imagine! Half the jobs we do cost less than $1000!

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Shown here is the plant building of the Aluminum Flake Co.

Aluminum Flake Co. in Process of Liquidation

► Aluminum Flake Co., Barberton, Ohio, has announced that the company is now in the process of liquidation. The firm was established in 1903 to produce Aluminum Flake, a clay which was originally developed as a filler in rubber compounds. Since then, this material has also found use in the manufacture of paints, enamels, abrasive wheels, colored roofing granules, structural adhesives and other products.

Frank Reifsnider organized the company shortly after discovering that the clay on his property in Missouri was a hydrated aluminum silicate of average 99 per cent purity which had refractory qualities not possessed by any other of the then known clays. It was later discovered that the deposits of this material were a geological freak and that there were no known deposits anywhere else in the world.

The small company was first established in Missouri and the crude clay was sold to refractories in St. Louis. At that time, the firm was called the Columbia Clay Co. Later, the name was changed to Reifsnider Clay Co., then to American Kaolin Co., and finally, to the Aluminum Flake Co. The name Aluminum Flake, a registered trademark, was chosen because of the high aluminum oxide content of this type of clay and because of the flake-like structure inherent in the material, which, under the microscope, has the appearance of a snow-flake.

The Barberton plant started manufacturing in 1904. This area was selected because it was close to the rubber industry in Akron. Mr. Reifsnider felt that the clay was too valuable to be used for refractory purposes. The company had grown over the years and Aluminum Flake was said to be the standard mineral reinforcing agent in rubber. Continued research demonstrated its value in other materials as well.

Throughout the years, the ranch in Missouri, where what is believed to be the sole supply of this mineral exists, has remained in the control of the Reifsnider family. Mr. Reifsnider died in 1909. Since then, the business has been carried on by his daughter, Bertha Reifsnider, who has served as a director and vice-president and treasurer.

Named Armour Research Director

► William H. Neuss has been appointed to the new position of manager of research for the Research and Development Department of the Armour Alliance Industries, Alliance, Ohio. He will supervise all research activities for the Armour Adhesive, Coated Abrasives and Cushioning Products Division. Prior to this appointment, Mr. Neuss was chief chemist of Adhesive research for the Stein, Hall Co., New York, N. Y. A graduate of Brooklyn College and New York University, Mr. Neuss is a member of the American Chemical Society, the American Association for the Advancement of Science and the Technical Association of the Pulp and Paper Industry.

Continental Carbon Expands

► Continental Carbon Co. is planning an expansion program at its carbon black plant in Lake Charles, La., which will increase that facility's annual capacity from 45,000,000 to 70,000,000 pounds of high-abrasive carbon black. To cost more than $2,000,000, work on the expansion project will start immediately with completion expected by the end of the year. The Lake Charles carbon black unit, which was built in 1951, will continue to receive its raw material from the Continental Oil Co. refinery at Lake Charles. The increased output will be distributed primarily to synthetic rubber manufacturers in the Gulf Coast area through Witco Chemical Co.

Rules on Firestone Tire Claims

► Federal Trade Commission has ordered the Firestone Tire & Rubber Co., Akron, Ohio, not to make misleading "original equipment" claims for its second-line tires. The Commission has also dismissed a charge that Firestone's tire names are deceptive. According to Commissioner Edward T. Tait, Firestone has spent a great deal of money to change the names of its tires to conform with tire advertising guides put out by FTC about a year ago. This ruling upheld a previous decision by Examiner J. Earl Cox, who stated that Firestone's early 1957 advertisements implied the company's second-line Super Champion, later named the Deluxe Super Champion tires, had been designed as original equipment for use on cars coming off factory lines when the ads were published.

Actually, Mr. Cox said, these tires were not being used as original equipment at the time, even though they were similar to first line or original equipment tires sold by Firestone before 1955. FTC, adopting Mr. Cox's decision, ordered Firestone not to advertise that any tire not currently used as original equipment had been used or designed for use as such without clearly and conspicuously disclosing the latest year the tire was sold and used as original equipment.

Anaconda Plant Makes Shipment

► Anaconda Wire and Cable Co., New York, N. Y., recently sent out its first shipment of wire and cable from its new Watkinsville, Ga., plant. The shipment was highlighted by brief ceremonies at which leading officials of Anaconda, Georgia Power Co., which received the first shipment, and Central of Georgia, were participants. D. T. Werner, plant manager, officiated at the ceremonies, while D. E. Allen, Anaconda's vice-president in charge of sales, welcomed the visitors and described the company's world-wide operations. D. E. Owens, plant superintendent, E. M. Shockley, sales service manager, and W. O. Lofgren, office manager, all of the Watkinsville plant, aided in the plant tour which followed the ceremonies.

New Jersey Zinc Names Two

► New Jersey Zinc Co., New York, N. Y., has announced that Paul L. Hoffman has joined its pigment sales staff and Lloyd R. Bray has become a technical service representative. Mr. Hoffman will represent the company in the metropolitan Philadelphia area, while Mr. Bray will make his headquarters at the New York City office. According to the company, both men have had broad experience in the application of zinc and titanium pigments, having spent a number of years in the firm's Research Department.

600 Attend Golf Tournament Of New York Rubber Group

► Six hundred persons attended the New York Rubber Group Golf Tournament on August 4, at the Forsgate Country Club in Jamesburg, N. J. B. A. Wilkes (Godfrey L. Cabot) served as chairman of the Golf Committee, which included C. J. Lewis (U. S. Rubber); D. H. McCondichie (Merck); F. Raba (Triangle Conduit); Fred Cooke (Cooke Color & Chemical); Ralph DeTurk (Cooke Color & Chemical); C. A. Mackintosh (Westwood Chemicals); and P. Fullam (DuPont).

Dick Stimetz (United Carbon) with a low gross of 74 was the winner of the Nesbit Golf Cup. Wes Curtis (Naugatuck) was second with a 76; Jim Wernersbach (Enjay) came in third with a 77. Fourth, fifth and sixth places went to Herman Fritz (DuPont), C. Basilone and Fred Kurtz, respectively. High gross golfer was George Winspear (R. T. Vanderbilt) with a 179 score, and G. Radcliffe (Permacel) was runner-up with a 154 tally. The five winners of the Kickers Contest were Fred Kurtz; Jack Mills (Goodall); R. E. Nippes (Columbia-Southern); John Pendergas; and Ed Finney (Pittsburgh Coke & Chemical).

Twenty-nine participants won prizes for birdies. They were F. H. Fritz; Tom Royal; Ed Buckley; Dick Henderson; E. Howell; Bill Smarz; Fred Kurtz; Ernie Rivers; Woody Woodward (American Zinc); George Rudeau (Whittaker, Clark, Daniels); Bob Carroll (R. E. Carroll); Tom Loser (Wyrough & Loser); J. Callan (Columbian Carbon); Jake Guepet (Flintkote); Jack Moran (Flintkote); Jim Wernersbach (Enjay); H. MacLean (Imperial Chemical); E. Sutton (British Anchor Chemical); W. Weber; G. Linderman; J. R. Shaw (Lee Rubber); Dick Stimets (United Carbon); C. A. Larson (Whitney Blake); Bruce Thorsberg (Dow Corning); G. F. A. Stutz (New Jersey Zinc); Ed Fillon (Alphaduct Wire & Cable); Larry Harden (General Electric); Rudy Kugler; and Al Polson (Apex Tire & Rubber).

Jack Moran (Flintkote) won first prize in the Nearest to the 12th Green contest. Runners-up were Wes Curtis (Naugatuck) and Ken Crouse (J. M. Huber). The Hole-in-One contest was won by George Emery (Naugatuck) who landed three feet from the hole. J. Burkhard (Goodrich-Gulf) took second place with a five foot, two inch mark, and D. F. Behney (Harwick Standard) came in third with a mark of six feet from the hole.

Soviet Rubber Technology

► The Research Association of British Rubber Manufacturers, in collaboration with Maclaren and Sons, Ltd., has prepared a new regular cover-to-cover translation of the Russian rubber journal *Kauchuk i Rezina*. The new journal will be issued monthly at an annual subscription rate of $50. The journal deals with the efficient use of raw material, the automation of manufacturing processes in the Soviet rubber industry, and improvements to the design of tires and industrial rubber goods. The journal will also contain articles describing the most important chemical research of interest to the rubber industry. The journal is translated and edited by Mr. M. Lambert, and produced under the auspices of the Department of Scientific and Industrial Research Translations Unit. Subscriptions can be obtained from Maclaren and Sons, Ltd., Maclaren House, 131 Great Suffolk St., London, S.E. 1, England.

Anaconda Transfers Buurma

► Edward C. Buurma, formerly manager of product development of Sequoia Wire and Cable Co., has been transferred to the parent company, Anaconda Wire and Cable Co. According to Anaconda, Mr. Buurma will be active in promotional sales work related to defense program activities. He will temporarily maintain his headquarters at the Sequoia Wire and Cable Mill, 2201 Bay Road, Redwood City, Calif.

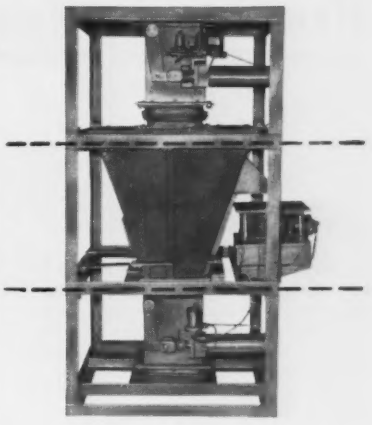
Offers Services to U. S. Industry

► The Scottish Council, 1 Castle St., Edinburgh, Scotland, has offered its services to American companies contemplating entering the European market or expanding existing interest in that market. Supported mainly by Scottish industry, the Council's objective is to promote industrial expansion and its services, therefore, are freely offered. Services include supplying all preliminary information which may be required in considering a Scottish based manufacturing operation including labor and raw material costs; site availability; building costs; rental and amortization facilities ;and all information enabling preliminary assessment of the possibilities of location in Scotland.

General Tire Expands Latex Unit

► General Tire & Rubber Co., Akron, Ohio, has completed a $350,000 expansion of its facilities for the production of paint, paper and textile latices at Mogadore, Ohio. The company has also augmented its tank car fleet to take care of the 50 per cent increase in production. The product, a styrene-butadiene latex called Gen-Flo, is used in rubber based latex paints, coated papers and in the textile industry. The additional facilities, which include a complete, new glass-lined reactor system, also provide for production of styrene-acrylic latices, called Acri-Flo, which is used for newly developed exterior latex paints.

THE W-C HOPPER SCALE



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Names in the News

Morrison M. Bump, formerly president of the Union Paste Co., has been named director of marketing for the United Carbon Co. and vice-president of its subsidiary, United Carbon Co., Inc.

Thomas H. Smith, manager of the Chemicals and Pigments Purchasing Department for the B. F. Goodrich Co., has been named "honor buyer of the year" by the Chemical Salesmen's Club of Cleveland.

William F. Waldeck, previously technical director of the Shea Chemical Corp., has been appointed technical director of the Globe Manufacturing Co.

Robert T. Daily has been appointed manager of marketing for the Silicone Products Department of the General Electric Co., succeeding **Jerome T. Coe,** who was recently named department general manager.

William E. Clark, who serves as vice-president and general manager of the Textile Division of the U. S. Rubber Co., has been appointed chairman of the Textile Institute.

Andrew R. Baumer has joined the staff of the B. F. Goodrich Co. Research Center in Brecksville, Ohio, as a technical man in the Physical Research Department.

Daniel J. Gowman has been appointed assistant vice-president in charge of the Essington, Penna., plant operations for Sartomer Resins, Inc., while John A. Cornell has been named director of research at that plant.

Homer C. Wilson, formerly director of supplies, has been appointed to the newly-created position of manager of operations for the Texas Butadiene and Chemical Corp.

Warren A. Yearick, formerly manager of Akron services accounting for the B. F. Goodrich Co., has been promoted to manager of engineering cost and property accounting.

Leon W. Miller, director of chemical sales for the Plastics and Coal Chemical Division of Allied Chemical Corp., has been elected to the Board of Directors of the New York Board of Trade.

William M. Burr, Jr., formerly with C. K. Williams & Co., has been named organic chemicals sales representative in Ohio for the Organic Chemicals Division of Dewey and Almy Chemical Division.

Frank J. Opatrny, who was previously an assistant sales manager, has been promoted to eastern sales manager for the Parker Seal Co.

Morris E. Dry, senior partner in the law firm of Arthur, Dry and Dole, has been appointed general counsel for the U. S. Rubber Co. He was formerly associate general counsel for the company.

George A. Hobach, formerly a sales representative with A. C. Mueller Co., has been appointed special representative in the Akron office of Tyrex Inc.

Roland Reppert has been named to the newly created position of vice-president, marketing, for the American Hard Rubber Co. and will be succeeded as vice-president, sales, by **James P. Coughlin.**

Thomas W. Blazey, formerly chief accountant for the B. F. Goodrich Co., has been appointed assistant controller for that firm.

J. A. Tallant, previously Rubber Chemicals Sales Division coordinator in the Phillips Chemical Co., has been appointed managing director of Phillips Carbon Black Co. (Pty.) Ltd. He will be located in South Africa.

David W. Mitchell has been named coordinator for research and production and will continue to act as manager of minerals research for the Research and Development Laboratories of the Foote Mineral Co.

William P. Bray, senior buyer in the Purchasing Department of the Firestone Tire & Rubber Co., has been named president of the Purchasing Agents Association of Akron.

John M. Hussey, district manager for the Goodyear Chemical Division at Boston, Mass., recently completed 25 years of continuous service with Goodyear Tire & Rubber Co.

Frederick L. Bissinger has been elected to the newly created position of vice-president and general manager of Industrial Rayon Corp.

John B. Dyson, previously with Thompson, Weinman Research Laboratory, has joined I. B. Kleinert Rubber Co. as director of research and development.

Gene John Fluri, formerly senior accountant with Peat, Marwick, Mitchell Co., has joined the Lee Rubber & Tire Corp. as assistant controller.

Chester M. Brown has been elected president and chief operating officer of Allied Chemical Corp. **James G. Fox** becomes president of the National Aniline Division; **Irb H. Fooshee** has been named vice-president of manufacturing; and **I. H. Munro** becomes vice-president of marketing.

Lee R. Jacobs, previously with DuPont, has been appointed sales manager of industrial products for Acme Backing Corp.

Martin B. Friedman has been named manager of the Advertising and Promotion Department of the Organic Chemicals Division of American Cyanamid Co.

Laurel G. Parkinson has been appointed general manager, marketing of Amoco Chemicals Corp.

Maurice S. Letourneau has been named manager for the Polyco-Monomer Department of the Borden Chemical Co.

Dabney L. Conner and **William O. Suiter** have joined Copolymer Rubber & Chemical Corp. as chemists, while **James A. Askins, James R. Hall** and **Tommie A. Purifoy** have joined the company as chemical engineers.

William P. Flower has joined the Crown Rubber Co. as sales manager for its Foam Products Division.

Mark D. Inskeep has joined Connecticut Hard Rubber Co. as a project leader in research and development.

Charles A. Wyman, executive vice-president of H. O. Canfield Co., and vice-president of Pantasote Co., has been announced as general chairman of the 1959 Sister Elizabeth Kenny Foundation fund appeal among commerce and industry in Greater New York.

John Sly has been named assistant sales manager for the Industrial Products Division of Dayton Rubber Co. **Joseph B. Maxson** succeeds Mr. Sly as central region manager. **J. R. South** has been appointed product manager for the firm's Urethane Department. **A. L. Schriml** has been named product sales manager for the company's line of Poly-V drive.

H. Greville Smith has been elected to the board of directors of Dominion Rubber Co.

Robert H. Walsh has been named sales manager for synthetic rubber and other elastomeric products of DuPont (U.K.), Ltd.

Robert W. Grimble has been named assistant director of manufacture for the Elastomer Chemicals Department of DuPont.

Detroit Group Holds Golf Outing

► Scattered morning showers failed to dampen the enthusiasm of a capacity crowd of 450 members and guests at the Detroit Rubber and Plastics Group Annual Golf Outing on June 26 at the Western Golf and Country Club in Detroit, Mich. Two hundred golfers took to the green and low gross honors went to A. L. Nevens, who shot a 2 over par 74. Second low gross was taken by H. Macklin with a 78. First low net was won by H. Lademan, second place was taken by A. Rosenstein, and third spot by Jack Ross. Other prize winners were T. Oszewski for closest to pin on hole 9; K. E. Parker, second closest on hole 9; R. L. Kessler, longest drive to hole 10; Art Watkins, second longest drive to hole 10; and W. McConnell and Jerry Stephens in a tie for high gross.

In addition to the golf prize winners listed, there were some 20 additional draw prizes for the golfers. Another feature was the awarding of 50 draw prizes among the dinner guests. R. W. Malcolmson (DuPont) was general chairman of the Arrangements Committee, which included Phil Millard (Automotive Rubber); Walt Wilson (R. T. Vanderbilt); W. F. Miller (Yale Rubber); Bert Millard (Automotive Rubber); and Bob Chilton (Permalastic Products).

Storti Heads Rhee Elastic

► Michael Storti has been elected president and general manager of the Rhee Elastic Thread Corp., Warren, R. I., succeeding Daniel Rhee, founder of the firm, who has been elected chairman of the board of directors and who will continue as treasurer. Mr. Rhee also plans to devote his efforts to the development of new products for the implementation of the company's present line.

Mr. Storti, who will assume the general administrative management of the company's affairs, joined Rhee Elastic nearly two years ago as sales manager. Previously, he had been with the Woonsocket Rubber and Plastics Products Co., Inc., as general sales manager. He has also been associated with the Newth Rubber Co., Barrington, R. I., as production manager. Mr. Storti was graduated from Northeastern University with a degree in electrical engineering.

New Officers Elected

► Scrap Rubber and Plastics Institute of the National Association of Waste Material Dealers, New York, N. Y., has elected Ben Gordon (A. Schulman) as president. Serving with Mr. Gordon as officers are Sidney Freedman (H. Muehlstein) as *vice-president;* and Harold C. Rowe (N.A.W.M.D.) as *secretary-treasurer.* A completely new executive committee has also been appointed, including Henry Rose (H. Muehlstein), Milton Kushkin (A. Schulman), Charles Rasher (McMahon Iron & Metal), Joseph Viener (Hyman Viener & Sons) and Hy Helbein (Southern Metals).

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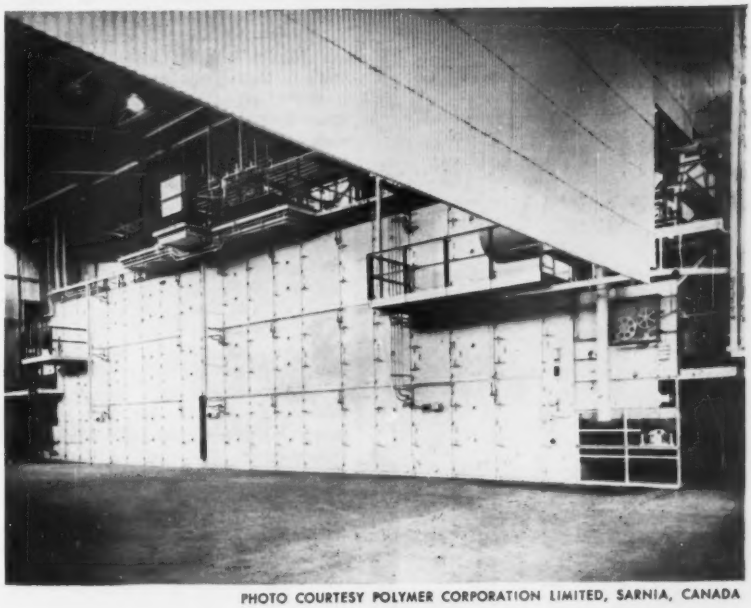

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G.E. Nitrile Silicone Rubber

► Silicone Products Department of the General Electric Co., Waterford, N. Y., has announced that its new line of nitrile silicone rubbers, NSR-X5602, is now available in evaluation quantities. NSR-X5602 is intended for intermittent contact with high swell fluids or continuous immersion in milder fluids. It is a 60 durometer, relatively low modulus stock, suitable for such applications as airframe seals, boots, diaphragms and shock mounts, and can be fabricated by extrusion, molding or calendering, the company states.

G.E. reports that Two other types of nitrile silicone rubbers, NSR-X8701 and NSR-X4803, will be available for evaluation this spring. According to the company, NSR-X8701 can be used for applications requiring outstanding high temperature oil resistance. It is reported to be a 70 durometer rubber and suitable for such molded parts as O-rings, gaskets and oil seals continuously immersed at elevated temperatures. NSR-X4830 is said to be an 80 durometer rubber with intermediate resistance to high temperature fluids, and is designed principally for oil seals for automotive transmissions. The company states that it will also be useful in O-rings, gaskets and similar molded, extruded or calendered parts, for use where fluids encountered are not severe in effect or immersion is not continuous.

Marbon Appoints Two

► D. M. Pratt has been appointed sales manager for resins and adhesives and William A. Suiter has been named sales manager for "Cycolac" plastic in a realignment and expansion of the sales management staff of the Marbon Chemical Division of Borg-Warner Corp., Chicago, Ill. Both Mr. Pratt and Mr. Suiter will make their headquarters at Marbon's newly-constructed facilities at Washington, West Va. Mr. Pratt, who joined the firm in 1934, has been assigned to take charge of the enlarged sales program covering paint and rubber reinforcing resins, and Ty-Ply adhesive products. As manager of Cycolac sales, Mr. Suiter will supervise the marketing of Marbon's newest product, a high-impact, heat resistant, thermoplastic material used in industry, defense and the home. Mr. Suiter was previously employed by the Panelyte Division of the St. Regis Paper Co.

Australian Plant Near Completion

► B. F. Goodrich (Australia) Pty, Ltd., reports that it expects to be producing automobile tires in Melbourne, Australia by January, 1960. According to the company, plant construction is two months ahead of schedule. B. F. Goodrich Co., Akron, Ohio, has a controlling interest in the Australian company, while Ampol Petroleum Ltd., holds a 43 per cent interest.

Rubber Technology Course

► The Fifth Annual Course in Rubber Technology co-sponsored by the Boston Rubber Group and Northeastern University will commence on September 21 at the School of Business, Northeastern University, Boston, Mass. The course will consist of 15 sessions and is designed for beginning compounders, sales representatives, purchasing agents, production supervisors, specification writers, university students, and others interested in broadening their knowledge of the rubber industry. The scope of the course is a basic and practical study of compounding and processing of natural and synthetic rubbers. Common compounding ingredients, various elastomers and basic processing techniques and equipment will also be covered. Some attention will be given to test methods and quality control. Robert Loveland, district representative, R. T. Vanderbilt Co., will be the instructor. Mr. Loveland is a graduate of Tufts College. He instructed chemistry and mathematics for 14 years at Drexel Institute Evening Session, and has nearly 30 years experience in the rubber industry.

Chemical Industries Exposition

► The 27th Exposition of Chemical Industries will be held on November 30-December 4, at the New York Coliseum, New York, N. Y. It has been announced that more than 450 manufacturers have already engaged space for displays. One section of the exhibition will be devoted to chemicals, including ingredients of extremely high purity, new derivatives offered for the improvement of existing products, and samples of end products manufactured with the aid of new formulations.

Another section will consist of laboratory equipment and supplies. This array of new instruments will incorporate many examples of advanced design in the fields of electronics and radiation technology. The display of processing equipment will run through the alphabet from agitators and ammoniators, blenders and blowers, classifiers and concentrators to dissolvers, evaporators, filters, heat exchangers, homogenators, impregnators and so on.

U.S. Navy Rubber Formulary

► The Department of the Navy, Washington, D. C., has announced the availability of *Revision Five of the Bureau of Ships Rubber Formulary*. The department reports that several new formulations have been added and all material has been brought up to date. The formulations and test data in the formulary were compiled by the rubber laboratory at Mare Island Naval Shipyard, Vallejo, Calif., for the assistance of rubber manufacturers in the fabrication of products to conform with the requirements of various military and federal specifications. Copies are available from the Bureau of Ships, Navy Department, Washington 25, D. C.

Goodrich Names Two

► B. F. Goodrich Co., Akron, Ohio, has announced the appointment of Victor F. Springer as manager of tire compounding for B. F. Goodrich Tire Co., succeeding Laurence R. Keltner who was recently named senior divisional manager. The company also announced that J. Kenneth Koster has been named manager of production and engineering at the Calvert City, Ky., general chemical plant of B. F. Goodrich Chemical Co.

Mr. Springer, who has been technical manager in the Compounding Department for the past three years, joined Goodrich in 1940 after graduating from the University of Wisconsin with a B.S. degree in chemistry. He has held positions in the company's general chemistry laboratory, the Raw Materials Control and Inspection Department and the Tire Development Division.

Mr. Koster joined Goodrich in 1940, at the Cadillac, Mich., plant. In 1950, he was assigned to the Institute, West Va., Government man-made rubber facility, and later became supervising engineer and production manager at the plant. In 1953 he joined the Engineering Department of Goodrich Chemical in Cleveland, and worked on the company's Calvert City, Ky., acrylonitrile plant expansion and headed the construction of the Hycar expansion at Louisville, Ky., as well as the new plant construction at Henry, Ill. When the Henry plant was nearing completion, he was named manager of construction for the company, a post he has held until his present appointment.

General Tire Building Plant

► General Tire & Rubber Co., Akron, Ohio, broke ground for the construction of its new $9,500,000 tire manufacturing plant at Mayfield, Ky., on August 4. M. G. O'Neil, executive assistant to the president and vice-president of General Tire, officiated at the ground-breaking ceremonies which was attended by company, state and local officials, including Lt. Gov. Harry Lee Waterfield, who formally welcomed General Tire to Kentucky. According to Mr. O'Neil, the Mayfield plant, which is the company's third domestic tire factory, is being built because of greatly increasing highway travel and an anticipated rising demand for more tires as the nation's motorists roll up new mileage records each succeeding year. The Mayfield plant, he said, is designed to be expanded as automobile and truck travel increase.

Blending Chart Available

► Beacon Chemical Industries, Inc., Cambridge, Mass., has announced the availability of an oleum-sulfuric acid blending chart. According to Beacon, this chart will be an invaluable aid in projecting and figuring concentrations. A free copy of this chart can be obtained from Beacon Chemical Industries, Inc., 33-51 Richdale Ave., Cambridge 40, Mass.

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SPECIAL PAPERS FOR SPECIAL PURPOSES

Financial News

Detroit Gasket & Mfg.

► Six months ended June 30: Net income before taxes amounted to $1,104,111, compared with a loss of $438,196 for the same period in 1958. Net income after taxes totaled $526,727, equal to earnings of 68c per share of common stock, compared with a loss of $208,421, and no earning per share for the same period in 1958. Net sales totaled $18,880,565, compared with $11,505,140 in the 1958 six month period.

Sheller

► Six months ended June 30: Net income after taxes amounted to $869,431, equal to 91c per share of common stock, compared with a net loss, after tax credit, of $163,832, or 17c per share calculated on the same basis, for the same period a year ago. Consolidated net sales were $22,458,196, compared with $12,852,521 for the previous year's first half.

B. F. Goodrich

► Six months ended June 30: Net income after taxes and all charges amounted to $19,612,490, equal to earnings of $2.18 per share of common stock, compared with an income of $14,307,241, or $1.60 per share, for the first six month period of 1958. Net sales came to $383,369,949, compared with $444,975,305 a year ago.

Pantasote

► Six months ended June 30: Net income amounted to $275,261.58, equal to earnings of 46c per share, compared with a net loss of $60,086.11, with a deficit of 10c a share in the same period of 1958. Net sales totaled $4,399,805.53, compared with $2,016,380.77 in the 1958 period.

Wyandotte Chemicals

► Quarter to March 31: Net income of $744,498, which is equal to 43c a common share, compared with a loss of $113,983 in the first quarter of 1958. Sales in the 1959 first quarter totaled $19,582,144, compared with $16,789,208 in the same period of the preceding year.

Mohawk Rubber

► Six months ended June 25: Net income was $617,000, equal to $2.58 per share of common stock, compared with $426,000, or $1.78 per share for the 1958 period. Net sales in the first six months of 1959 totaled $14,595,000, compared with $10,830,000 in 1958.

Mansfield Tire & Rubber

► Six months ended June 30: Net income amounted to $1,101,667, equal to earnings of 78c per share of common stock, compared with $923,129, or $1.55 per share for the like period in 1958. Net sales totaled $34,876,480, compared with $31,147,571 for the same period in 1958. The equity of undistributed net income of affiliated companies was $441,382 in the first half of 1959, compared with $381,721 a year earlier.

U.S. Rubber

► Six months ended June 30: Net income after taxes amounted to $18,956,286, or $2.85 per share of common stock, compared with $8,696,611, equal to $1.06 per share for the like period of 1958. Net sales totaled $508,854,623, compared with $403,100,995 for the 1958 half year period.

Witco Chemical

► Six months ended June 30: Net income amounted to $990,700, or $1.30 per share of stock, compared with $765,700, or $1.26 per share, before nonrecurring income of $272,900 or 45c per share, for the like period of 1958. Net sales totaled $24,882,200, compared with $18,652,500 for the first half period of 1958.

Dayton Rubber

► Six months ended April 30: Net income of $1,008,036, which is equal to 91c per common share, compared with $503,158, or 44c a share, in the 1958 fiscal six month period. Sales in the fiscal half totaled $43,268,926, compared with $38,210,005, at the same time last year. Per share earnings were computed after Class A dividends.

Clevite

► Quarter ended March 31: Net income of $1,456,000, which is equal to 76c per common share, compared with $423,000, or 20c in the equivalent period last year. Sales in the first quarter of this year totaled $19,998,000, compared with $15,656,000 in the 1958 first quarter.

Raybestos-Manhattan

► Six months ended June 30: Net income amounted to $1,832,818, which earned $2.90 per share of common stock, compared with $526,673, or 83c per share for the like period in 1958.

Rubbermaid

► Nine months ended June 30: Net income after taxes amounted to $963,000, equal to earnings of 74c per share of common stock, compared with $670,000, or 52c per share of stock which was adjusted to reflect increased shares resulting from a 5 per cent stock dividend paid on December 1, 1958, for the like period of 1958. Net sales totaled $17,760,000, compared with $15,206,000 for the 1958 nine month period.

American Biltrite Rubber

► Six months ended June 30: Net income amounted to $1,663,225, equal to earnings of $1.22 per share of common stock, compared with income of $1,213,598, or 92c per share for the same period in 1958. Net sales for the first six months of 1959 totaled $36,825,857, compared with $28,573,166, for the like period a year ago.

National Rubber Machinery

► Six months ended June 30: Net income after taxes amounted to $170,561, equal to earnings of 83c per share of common stock, compared with a loss of $145,115, with no earnings, for the same period in 1958. Net sales for the 1959 six month period totaled $5,508,573, compared with $4,029,360 a year earlier.

New Jersey Zinc

► Six months ended June 30: Net income after taxes amounted to $1,895,307, or 96c per share of common stock, compared with $99,848, equal to 5c per share, for the like period of 1958. Net sales totaled $10,116,426, compared with $6,478,289 in the 1958 first six months.

Plymouth Rubber

► 26 weeks ended May 31: Net income for the period amounted to $550,289, equal to common share earnings of 62c, compared with an income of $438,067, or 49c per share for the like period of 1958.

Plastic Wire & Cable

► Six months to April 4: Net income of $232,212, which is equal to $1.22 per share. Sales in the six months to April 4 totaled $5,894,347. A 1958 comparison was not available.

Pierce & Stevens Chemical

► Six months ended June 30: Net earnings totaled $331,400, or $1.02 per share of common stock, compared with $229,500, equal to 74c per share for the same period of 1958.

Butyl Process Is Licensed

► U. S. Rubber Co., New York, N. Y., has licensed its major competitors and a group of other companies to vulcanize butyl rubber by a new process that makes possible large scale savings and greatly improved rubber products, the company announced. The major competitors are Goodyear Tire & Rubber Co., Firestone Tire & Rubber Co., B. F. Goodrich Co., General Tire & Rubber Co., and Seiberling Rubber Co. Included among the other licensees is the Continental Can Co.

Butyl rubber cured by U. S. Rubber's process has high heat resistance and is especially suitable for products that are subjected to high temperatures for a long time. One of its major uses is in tire curing bags. Bags made of this butyl are said to last five times as long as the standard butyl bag. Other companies licensed under the U. S. Rubber patent are: Baldwin Rubber Co., Pontiac, Mich.; Dill Manufacturing Co., Cleveland, Ohio; Durkee-Atwood Co., Minneapolis, Minn.; International packings Corp., Bristol, N. H.; Mosites Rubber Co., Fort Worth, Texas; Roth Rubber Co., Chicago, Ill.; and Stedfast Rubber Co., Boston, Mass.

Tyrex Expands Field Force

► Three new representatives have been added to the field force of Tyrex, Inc., New York, N. Y., voluntary non-profit association representing five major manufacturers of tire yarn and cord. Lawrence K. Keogh, formerly associated with the Sinclair Refining Co., will handle special assignments in the New York City area. H. L. Baumgardner, Jr., previously with the Seiberling Rubber Co., has been assigned to the Detroit office, and Patrick Montroy, also formerly with Sinclair, has been assigned to a newly established Chicago office.

The representatives will maintain liaison with fleet operators, major contractor accounts and retail tire outlets in behalf of the new Tyrex viscose tire cord. Manufacturer-members of Tyrex Inc. are the American Viscose Corp., American Enka Corp., Beaunit Mills, Inc., Courtaulds (Canada) Ltd. and Industrial Rayon Corp.

To Expand Plant

► Granite State Rubber Co., Berlin, N. H., has announced plans for expanding its plant on West Milan Road in Berlin. With the proposed addition, the total area of the stitching and making plants will be about 100,000 square feet. It is estimated that the cost of the new building and installation of new equipment will be about $340,000. Construction is presently underway and the plant expansion is expected to be completed by December, 1959.

Rudolph W. Kugler

Named President's Assistant

► Cary Chemicals Inc., East Brunswick, N. J., has announced the appointment of Rudolph W. Kugler as assistant to George F. Blasius, president of Cary Chemicals. Mr. Kugler's primary duties will be those of administration and planning. Mr. Kugler is a graduate of Case Institute of Technology and holds a B.S. degree in chemical engineering from that institution. Prior to his present appointment, he was with Courtaulds, Inc., as manager of new product development. He was also a sales representative with the Dow Chemical Co., and purchasing agent for the Heil Process Equipment Co. Mr. Kugler is a member of the Society of Plastics Engineers, the American Chemical Society, the Commercial Chemical Development Association, and the Chemists Club of New York.

Huber Names Distributor

► J. M. Huber Corp., New York, N. Y., has named C. Withington Co., Inc., as its exclusive distributor for its new series of kaolin clay extenders and Zeolex synthetic silicate pigments in metropolitan New York and the state of Florida. Withington maintains a sales office and service laboratory at 47-40 Fifth St., Long Island City, N. Y., and a branch office and warehouse at 1641 Landon Ave., Jacksonville, Fla. The firm will furnish Huber raw materials to the paint, varnish, printing ink, plastics and specialty processing industries.

To Convert Tire Cord Plant

► Industrial Rayon Corp., Cleveland, Ohio, expects to have its Cleveland plant converted from rayon tire cord to production of Tyrex viscose tire cord by the end of 1959. The company also announced that a further increase in Tyrex viscose cord capacity at its Painesville, Ohio, plant should be substantially completed by the end of the year.

Dayton Buys Two Firms

► Dayton Rubber Co., Dayton, Ohio, has acquired two West Coast aircraft equipment manufacturers, the Hardman Tool and Engineering Co., Los Angeles, Calif., and Aircraft Standards, Inc., Santa Monica, Calif. Hardman is said to be one of America's largest aircraft seat manufacturers and a leading manufacturer of ejection seats, shoulder harnesses, inertia reels, fuel tanks, baggage containers, sheet metal and welded tubular aircraft structures. Aircraft Standards designs and manufactures highly-engineered tools, dies and fixtures for the aircraft and missile industries. Acquisition of these two subsidiaries ties in with Dayton's stepped up program to become a major supplier to the aircraft and missile industries centered in Southern California. Officers of the new subsidiaries are C. M. Christie, president; T. P. Dougan, vice-president; and Victor Koontz, assistant secretary and treasurer.

Mastic Executive Appointments

► Mastic Tile Corp. of America, Vails Gate, N. Y., has announced the appointment of Ralph Saccoman as vice-president, special assistant to the president in charge of operations. Arthur W. Colley has been named vice-president for manufacturing succeeding Mr. Saccoman. Mr. Saccoman began his tile-making career in 1929 and is responsible for many innovations and improved methods in the field. Mastic's chief of manufacturing since 1947, he set up its first plant at Newburgh and later, its Long Beach, Calif., and Joliet, Ill., plants. Mr. Colley has a 24 year background in the smooth surface flooring industry. Previous posts include that of manager of manufacturing at Congoleum-Nairn. He was also associated with the Armstrong Cork Co., where he served as assistant plant manager, general production superintendent, and also handled contract sales.

Wire and Cable Symposium

► The 8th Annual Wire and Cable Symposium, sponsored by the U. S. Army Signal Research and Development Laboratory, will be held on December 1 to 3 at the Berkeley-Carteret Hotel, Asbury Park, N. J. Some 25 technical papers will be presented showing progress made during the preceding year in the field on communication wires and cables. Heading the Symposium Committee this year is Howard F. X. Kingley (USASRDL). Also on the committee are F. W. Wills (USASRDL); Ray Blain (USA Signal Engineering Agency); C. T. Wyman (Bell Telephone Laboratories); J. L. Robb (Superior Cable); Benjamin Levinson (Okonite); I. T. Stoneback (I. T. & T. Laboratories); and H. L. Wuerth (Goodrich Chemical).

Albert Denied Receivership

► A request by financier Sydney L. Albert to throw operations of Albert-Harris Inc., Akron, Ohio, into another receivership was denied recently by common pleas court Judge Frank H. Harvey. The suit was made in connection with a $189,300 suit between the partners in the concern, Mr. Albert and Ed Harris. Attorney Ben Holub, representing Mr. Albert, stated that this move was deemed necessary because Mr. Albert and Mr. Harris own all stock jointly and can't agree on anything.

In another suit, Mr. Harris and his wholly-owned Goodride Tire Co., are trying to enforce collection of $189,300, which allegedly was advanced by Goodride to Albert-Harris to keep the latter firm afloat in late 1956. Mr. Albert was to have been the financial angel of the firm, while Mr. Harris was to have provided production know-how. Mr. Harris stated that his partner fell down on his money-raising obligations in late 1956.

Mr. Albert and Mr. Holub have been defending on the grounds of $1,000,000 worth of checks from Albert-Harris to Albert which represents money Mr. Albert says he put into the firm in its earlier days. He contends it is unfair for Mr. Harris to enforce his notes against the firm, while he, Mr. Albert, has only the checks which can not be enforced. Attorney L. Anthony Lombardi, representing Mr. Harris, stated that Albert took the checks at his own request when he could have had notes.

Dayton Produces Industrial Hose

► Dayton Rubber Co., Dayton, Ohio, has entered into the industrial hose field with the production of air, water, steam, suction and pressure hoses in a full range of sizes and construction. The company states that expanded production facilities and development of new construction techniques led to the decision to enter this field. Product manager for the industrial hose will be Jack O. Quamme, who has had nine years of experience in industrial products sales in the rubber industry. A native of Colorado Springs, Colo., Mr. Quamme holds a business administration degree from Colorado College.

Armstrong Develops New Compound

► Industrial Division of the Armstrong Cork Co., Lancaster, Penna., has announced the formulation of a new compound combining cork and silicone rubber. According to Armstrong, the compound, LC-800, allows the gasket designer to use cork and rubber gaskets at much higher temperatures than heretofore possible. LC-800 can be made in ribbon and lathe cut rings, both extruded and laminated, as well as mats, sheets, and die-cut parts, the company states.

Copolymer Increases Production

► Copolymer Rubber and Chemical Corp., Baton Rouge, La., has increased its dry synthetic rubber production capacity by opening a new production line which has twice the capacity of any of the other four lines. It produces approximately 6,000,000 pounds of rubber per month, increasing total dry rubber production capacity to approximately 18,000,000 pounds gross per month. This increase is another step in the company's program to expand production facilities in order to meet demands of its customers.

The new production line is modern in concept and design. Instruments and starting switches for motors are located on central panel boards to permit central control of operation. The dryer installation is gas fired and consumes 12 to 15 thousand cubic feet of gas per hour and the line has two balers with separate hydraulic systems. A polyethylene bale wrapper and a dry soapstone duster allow packaging in unit containers or bags. The line, which was operated at 80 per cent capacity through April, was expected to reach full production in May.

Honored by Women Engineers

► Dr. Desiree S. leBeau, director of research for Midwest Rubber Reclaiming Co., East St. Louis, Ill., received the 1959 award of the Society of Women Engineers as the woman of the year in the United States as a tribute to her significant contribution to engineering achievement. The presentation was made on June 6 at a banquet climaxing the annual national convention of the Society in St. Louis. Earlier this year, Dr. leBeau was selected as one of the ten Women of Achievement for 1958 in St. Louis. This award was made by the *St. Louis Globe Democrat*, to Dr. leBeau for contributions in the field of business.

Dr. Desiree S. leBeau (left) director of research for Midwest Rubber Reclaiming Co., receives the certificate of award for significant contributions to chemical engineering in colloids and clays from Catherine Eiden, president of the Society of Women Engineers.

DuPont Tire Yarn Review

► Approximately 300 technical representatives of the rubber industry met in Akron, Ohio, recently to attend the Fourth Annual Tire Yarn Review sponsored by E. I. du Pont de Nemours & Co., Inc. Technical papers covering the processing of tire yarns and experimental work with tires were presented by members of four technical organizations within the Textile Fibers Department of DuPont. Donald H. Heckert, industrial merchandising, and Franklin G. Parker, industrial technical service, reported results of cooperative testing programs carried on by DuPont with companies in the tire industry.

Long-range studies on fiber improvements and tire design were reported by Walter G. Mikell, Donald E. Howe, and Herbert G. Lauterbach, all of DuPont's Industrial Products Research Laboratory, and by Andrew G. Knox of the Nylon Research Division. The speakers were introduced by Howard P. Brokaw, manager of fiber sales to the rubber industry, and P. M. Walters, manager of tire merchandising. A summary of the program was presented by John M. Swanson, director of the Industrial Products Research Laboratory.

Named Firestone Plant Manager

► Firestone Tire and Rubber Co., Akron, Ohio, has appointed Warren E. Jones as factory manager at its Akron synthetic rubber plant. The responsibilities of Robert J. Easton, production manager of the plant, have been broadened, and J. P. Gorey has been promoted to technical manager of the plant. Mr. Jones started with the company in the Research and Development Department of its subsidiary, Xylos Rubber Co. He has been manager of technical sales. Mr. Jones holds a chemical engineering degree from Ohio State University. Mr. Easton joined Firestone in 1933 and has worked in the synthetic plant since 1947. In 1956, he was named production manager. Mr. Gorey joined Firestone after graduating from the University of Illinois in 1951 with a degree in chemical engineering. He has been chief chemist in the synthetic plant since 1956.

Rifflestrip Chute Liner

► B. F. Goodrich Industrial Products Co., a division of B. F. Goodrich Co., Akron, Ohio, has developed Rifflestrip, a new lining material for protecting wood and metal chutes used in moving raw copper. According to the company, it has combined the existing chute system with the new liner, which consists of two-inch strips of pure gum rubber. Goodrich reports that one such chute has been in test service three years without showing appreciable wear.

General Tire Names Three

► General Tire & Rubber Co., Akron, Ohio, has announced three major promotions to top production posts. William C. Martin has been named manager of the Ashtabula, Ohio, plant; Robert W. Laundrie is now manager of the Mogadore, Ohio, plant; and Louis E. Gressingh has been appointed technical superintendent at Mogadore. Mr. Martin is a graduate of Lehigh University with a degree in chemical engineering. He joined the Chemical Division of General Tire in 1952. He did liaison work on the Ashtabula plant during its construction and, subsequently, was named production superintendent at Mogadore. In 1958, he was plant manager at Mogadore.

Mr. Laundrie, who succeeds Mr. Martin at Mogadore, graduated from the University of Wisconsin in 1942. He joined General Tire in 1956 as chief process engineer of the Mogadore plant. He had previously held a position with the University of Akron Government Laboratories. Mr. Gressingh studied at the Polytechnical University of Budapest, Hungary, graduating with a degree in chemical engineering. He joined the Chemical Division of General Tire in 1956. Beginning as process engineer at Mogadore, he was named chief process engineer in 1957.

To Expand Production Facilities

► Rubber and Tire Materials Corp., Dallas, Texas, has announced that it is expanding production facilities and opening new branch warehouses in order to service tire recappers more efficiently. According to the company, a complete new tread rubber plant is under construction in Spartanburg, S. C., and production is expected to begin by January 1960. The Dallas and Spartanburg plants and the company's numerous branch outlets will enable it to offer overnight delivery service in nearly all areas except the far west on most all die sizes and grades of tread rubber, including fast cure types, the company states. Warren R. Phillips, Jr., assistant vice-president, will be in charge of the Spartanburg operation.

Georgia Marble Opens Plant

► The Calcium Products Division of Georgia Marble Co., Tate, Ga., has announced the opening of its sixth plant to increase production of its calcium carbonate products. The new $100,000 plant will produce Wingdale White, a product formerly produced only at the company's Wingdale, N. Y., plant. Because of its good color, good dispersion characteristics, low binder demand and unusual economy, Wingdale White is very well adapted for use in many industries including rubber, paint, plastics and mastic, the company states.

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John W. Simmons

Named President of Wilson

► John W. Simmons, formerly executive vice-president and secretary, has been elected president of the Wilson Rubber Co., Canton, Ohio. Prior to his association with Wilson Rubber, Mr. Simmons was vice-president and general manager of Becton, Dickinson & Co. of Nebraska, a wholly-owned subsidiary of Wilson's parent organization, Becton, Dickinson & Co., Rutherford, N. J. A native of Toledo, Ohio, Mr. Simmons attended Kent Preparatory School in Kent, Conn., and was granted a B.A. degree by Williams College. He served in the United States Coast Guard Reserve during World War II as a commanding officer of a destroyer escort with a reserve commission of full lieutenant. Mr. Simmons is a member of the Rubber Manufacturers Association, Manufacturers Surgical Trade Association, and Industry Advisory Committee on Rubber Hand Wear for the Quartermaster Research and Development Command.

Goodyear Plans Vinyl Expansion

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced plans for a multi-million dollar expansion program which will more than double its present vinyl flooring and counter-top production capacity. The expansion program will be carried out at Plant B of the subsidiary Goodyear Aircraft Corp. in Akron, site of the company's present manufacturing facilities for vinyl film and flooring products. To man the new production facilities, the company estimates an additional labor force of approximately 100 persons will be required. Some increase in sales personnel also is expected. The company reports that renovation of the plant area involved is already underway and new production equipment has been ordered. Some additional production is expected to result from this program by January, 1960, with April 1 the target date for completion of the entire project.

Extends Education Program

► Goodyear Tire & Rubber Co., Akron, Ohio, has renewed and enlarged its aid to education program, which was initiated two years ago. Administered by the non-profit Goodyear Foundation, the program this year will provide $161,000 in grants and scholarships to many higher-education institutions throughout the country. Scholarships have been raised from $750 to $1,000 and the Foundation will also make direct grants in aid to schools and foundations of independent colleges throughout the country. These grants will total $116,000. Each school participating in the scholarship program also receives an unrestricted grant to help offset administrative and other costs not included in tuition.

Twelve scholarships will be awarded to students of technical schools and four to students of liberal arts colleges. Fellowships in four fields are also included in the program. These are rubber chemistry, University of Akron; industrial economics and aeronautical engineering, Massachusetts Institute of Technology; and advanced highway engineering, International Road Educational Foundation. Each of these schools also receives a grant in aid. The Goodyear International Fellowship, which pays all expenses for one academic year to a student from a foreign country where Goodyear operates, has also been renewed. Besides aid to education through the Foundation, Goodyear also provides financial aid to technical and engineering employes who want to continue their technical studies in non-working hours.

Cabot in Argentina

► The Government of Argentina has announced the acceptance of a proposal made by Texas Butadiene & Chemical Corp., to build a synthetic rubber plant, a butadiene plant and a carbon black plant in Argentina. It has been reported that Godfrey L. Cabot, Inc., Boston, Mass., who has an interest in Texas Butadiene & Chemical Corp., will participate in this $40 million endeavor. According to Cabot, it will make a contribution in building and operating the carbon black plant. The plants will be located in the area of Comodoro Rivadavia in Patagonia, about one thousand miles from Buenos Aires.

Sargent's Names Representative

► C. G. Sargent's Sons Corp., Graniteville, Mass., has announced the appointment of D. H. Caldwell Co., Charlotte, N. C., as its exclusive sales engineering representative for the states of North Carolina, South Carolina, Virginia and Tennessee. Caldwell will handle Sargent's line of dryers and specialized machinery, which are used by the rubber industry.

George F. Halfacre

Elected Vice-President

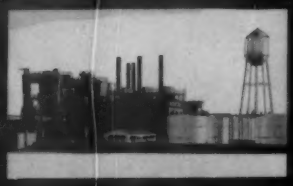
► George F. Halfacre has been elected vice-president in charge of manufacturing for the New Jersey Zinc Co., New York, N. Y., succeeding Philip M. Ginder, who has retired. Mr. Halfacre joined the company as a chemist in 1918 and has served as assistant chief and chief of the Slab Zinc Department; superintendent of the West Plant, Palmerton, Penna.; assistant general superintendent and general superintendent of the Palmerton plant; and manager of manufacturing. He is a graduate of Massachusetts Institute of Technology.

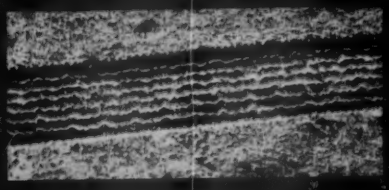
Increases Polyethylene Capacity

► Eastman Chemical Products, Inc., Kingsport, Tenn., has announced that capacity for the production of polyethylene at the Texas Eastman Co., Longview, Texas, will be increased from 85 million pounds to 100 million pounds annually. The company has also announced that recent additions to the OXO facilities at Longview have brought the capacity for aldehydes to 125 million pounds annually. Eastman Chemical, a subsidiary of the Eastman Kodak Co., markets the products of Tennessee Eastman Co. and Texas Eastman, divisions of Eastman Kodak.

Carwin Completes New Unit

► Carwin Co., North Haven, Conn., has completed its second versatile manufacturing unit, which is expected to double production capacity of Carwin's monoisocyanates, diisocyanates and polyisocyanates. As a result of this added capacity, Carwin has announced commercial availability of ethyl isocyanate and phenyl isocyanate and also plans to offer aliphatic diisocyanates and higher molecular weight aliphatic monoisocyanates in addition to its present tonnage products, n-butyl- and n-propylisocyanate, tolidine, diisocyanate, dianisidine diisocyanate, and PAPI (polymethylene polyphenylisocyanate).

From here 

to here 

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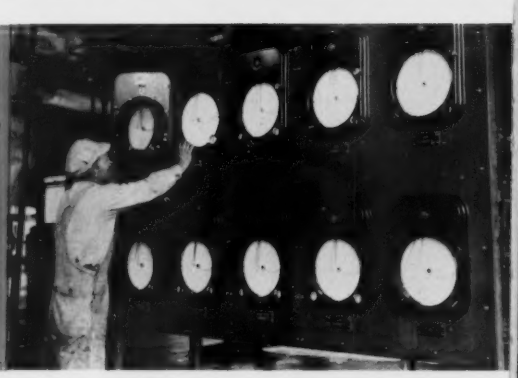

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NCRG Holds Technical Meeting And Annual Golf Outing

► "ASTM Activities" was the theme for the May 7 meeting of the Northern California Rubber Group which was held at the Berkeley Elk's Club, Berkeley, Calif. The three speakers for the evening, all members of ASTM D-11 Committee on Rubber and Rubberlike Materials, were R. G. Seaman *(Rubber World);* T. D. Bolt (Godfrey L. Cabot); and F. H. Fritz (DuPont).

Mr. Seaman, who is chairman of Subcommittee 8 on nomenclature and definitions and a member of Subcommittee 13 on synthetic elastomers, discussed recent developments in ASTM nomenclature and styrene rubber numbering systems. He pointed out that although the rubber industry has been in existence for over 120 years, it is still having a difficult time finding a definition for the term rubber. An accurate definition is important to both polymer producers and rubber manufacturers from the standpoint of import duties and transportation charges, he stated.

To illustrate the confusion which now exists, Mr. Seaman said that in answer to the question, "Is rubber an elastomer?", one-half of the rubber technologists surveyed, answered yes; the other half answered no. Citing similar examples, the speaker pointed out the need to devise quantitative definitions for rubber and like materials.

Polymer Numbering Systems

With regard to polymer numbering systems, Mr. Seaman pointed out that under the government operation all producers adhered to the numbers established. The "X" numbers were experimental; when the production reached a sufficient volume, the rubber was assigned a number. Since the release of the rubber plants to private industry, a few producers have adopted their own numbering codes, and this has led to confusion among the consumers as to what types of polymers are available, he stated. Mr. Seaman remarked that he is conducting a campaign to urge the producers to conform to the system of numbering recommended by Subcommittee 13.

Mr. Bolt, who is a member of Subcommittee 29 on compounding ingredients and also secretary of Committee D-24 on carbon blacks, spoke on recent developments in ASTM rubber and carbon black testing. He described how the confusion among both suppliers and consumers of carbon blacks with regard to testing procedures led to the formation of Committee D-24. This committee, he felt, set a new record for the number of test procedures adopted in one year. Some of the tests were for ash, moisture, pH, bulk density, fines and attrition. More recently

R. A. Claussen (H. K. Porter), first winner of the Witco Perpetual Trophy, which will be awarded each year to winners of the annual golf tournament of the Northern California Rubber Group.

the committee has been concerned with sampling procedures and mass strength tests for measuring pellet hardness and the resistance of the black to break up into fines, he stated. Another test which will be revised at the next committee meeting is the iodine absorption test, he said.

Mr. Bolt reported that with regard to Subcommittee 29, proposals are being considered to change the mixing cycles and test formulations. He explained that the present mixing procedure requiring a total time of 17 to 18 minutes which includes a 9 minute Banbury mix followed by an 8 or 9 minute mill mix is considered too lengthy for control testing. He informed the group that the procedure will probably be changed to a 6 minute Banbury mix in which sulfur and accelerators are added directly to the mixer.

Another recommendation being considered, stated Mr. Bolt, is to use the same formula for channel blacks as for furnace blacks and compensate for the slower curing characteristics of the former by increasing the cure time. Another change recommended in the test formula was the use of 50 phr black for all grades except for thermal blacks. According to Mr. Bolt, the committee has decided to establish a large lot of HAF black as a general class of reference, and all types of blacks will be checked against this reference. Mr. Bolt expressed hope that these items will be clarified at the next meeting of the committee.

Mr. Fritz, chairman of Subcommittee 19, discussed new test methods which are not ASTM methods but which are under development by DuPont at the present time. The tests described by Mr. Fritz were flame resistance, high temperature aging, and ozone and weathering exposure. He stressed that the test method must not only duplicate as closely as possible the particular service condition, but must do so quickly and as inexpensively as possible. In describing the flame resistance test, Mr. Fritz explained that heat from an electric arc is focused on a specimen by parabolic reflectors. The temperature is controlled by light filters and measured by a thermocouple. The four observations which can be made with this apparatus are: kindling temperature; flame propagation; breaking time; and vapor ignition temperature. This test is used to study the combustibility of elastomers and the effect of compounding ingredients, he stated.

In his discussion of high temperature aging, Mr. Fritz stated that the use of metal blocks as a heat source for test tube fluid aging at 500°F. was quite satisfactory if reflux condensers were used as prescribed by ASTM method D-471. In oven aging at elevated temperatures, he said that he has found oven temperature variability to be the major cause of inter-laboratory differences in test results. The trend appears at present to be toward limited range ovens with more accurate control in narrow temperature increments and the use of baffles or perforated plates to assure uniform air flow, according to the speaker. With reference to ozone exposure, Mr. Fritz described a dynamic ozone testing apparatus developed by DuPont which, by flexing and bending a rectangular sample at a given speed and ozone concentration, enables them to obtain better correlation with service experience.

Annual Golf Outing

The June 19 meeting of the Northern California Rubber Group was combined with its annual golf tournament which was held at the Green Hills Country Club, Millbrae, Calif. R. A. Claussen (H. K. Porter) was awarded the Witco Perpetual Trophy for his low net on the course. This was the first time such a trophy was awarded. The trophy, which was presented to the NCRG by the Witco Chemical Co., will be awarded each year to the winner of the annual golf tournament. In the event that one persons wins twice, the cup will remain permanently in his possession and Witco will provide a new trophy for future tournaments.

Al Frederico (C. P. Hall) and Wally Jensen (Burke Rubber) tied for second low net and were awarded an ice crusher and a Chargalite flashlite, respectively. Drace Kutnewsky (Burke Rubber) was presented with a practice ball for his high gross score.

Dan Robertson (Titanium Pigment) was chairman of the golf tournament, with Joe Mattson (Witco Chemical) as his assistant. Following the golf match and dinner meeting, a film was shown featuring a match play between professional golfers Sam Snead and Carey Middlecoff.

U. S. Rubber Unit Near Completion

► U. S. Rubber Co., New York, N. Y., has announced that new research facilities, located at the main plant of the Naugatuck Chemical Division in Naugatuck, Conn., are nearing completion. The new laboratory will be used primarily for company-sponsored research on solid fuel components. For the past three years, the company's Chemical Division has been experimenting in this field and work had progressed to a point where separate research facilities were needed. The new research facilities will also be utilized for research work on solid fuel materials conducted by Naugatuck under contract with the U. S. Naval Ordnance Department.

The new laboratory, a one story brick and steel structure, will have approximately 1,000 square feet of floor space. It will contain necessary equipment to make and test new fuels on a small scale and will also have extensive safety equipment. According to the company, solid fuels are basically a mixture of an oxidizing agent and a plastic or synthetic rubber. The rubber or plastic is a binder which also burns. The oxidizing agent supports accelerated combustion. The advantages of solid fuels are said to include simplicity, easy storage, safety and instant readiness.

Shaw Leaves Rubbermaid

► Forrest B. Shaw, president and general manager of Rubbermaid, Inc., Wooster, Ohio, has announced his resignation from the company for personal reason. Mr. Shaw had been president of the company since August 1958, when he succeeded James R. Caldwell, founder of the company. Mr. Caldwell, now chairman of the firm's executive committee, has announced that the interim duties of the president will be handled by Donald B. Noble, executive vice-president. Mr. Shaw, a veteran of 34 years in the rubber industry, was associated with Goodyear before joining Rubbermaid in 1945 as production manager. At that time the firm was known as the Wooster Rubber Co. He served as factory manager and vice-president in charge of production before assuming the presidency.

Goodrich Donates Plant

► B. F. Goodrich Co., Akron, Ohio, has announced that it will give its vacated 143,000 square foot Cadillac, Mich., plant to the city of Cadillac at no cost. The plant, on a 13 acre tract, has an appraised value of $280,000. Goodrich, which made rubber products for the auto industry at the plant, closed it in May, 1959.

Firestone Appoints Hathaway

► Firestone Tire & Rubber Co., Akron, Ohio, has appointed Earl B. Hathaway as vice-president in charge of all sales for the company. Mr. Hathaway, previously vice-president in charge of trade sales, will coordinate sales in the six fields in which the company is expanding its activities, namely rubber, metals, plastics, synthetics, textiles and chemicals. The company also announced that Charles L. Largent, who has been eastern division manager, was named general trade sales manager. In this position he will take over Mr. Hathaway's former duties, and will move to Akron from New York City.

Mr. Hathaway graduated from Northwestern University in 1927 with a B.S. degree in commerce. He joined Firestone in 1927, and after completing the sales training course, was assigned to the Chicago district. In 1928 he served as a tire adjuster in Detroit, and then as a sales representative from 1930 to 1932. In 1936, he was named assistant manager of the Chicago sales district and two years later was promoted to Detroit district manager. In 1941, he moved to Akron as wholesale sales manager and in 1942 was named eastern division manager. Mr. Hathaway was made Akron division sales manager in 1948 and trade sales manager of the entire company in 1952. He was elected a vice-president in 1957.

Mr. Largent attended the University of Texas and Marquette University. He joined Firestone as a budget salesman in 1938. He served as a store manager and a budget supervisor in Oklahoma City and in Bartlesville, Okla., until his appointment as a store supervisor in the Houston, Texas, district in 1945. He became Houston district manager in 1946 and eastern division manager in 1953.

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New Reclaim Rubber Plant

► U. S. Rubber Reclaiming Co., Inc., Buffalo, N. Y., has acquired 34 acres of land in Vicksburg, Miss., for a plant to serve the middle south and southwest rubber market. The company reports that the plant will cost $1 million and construction is underway. The plant, which will produce Reclaimator rubber for automobile tires, highway joint seals and road paving, will have an estimated initial capacity of 70,000 pounds per day.

Rubber Proofers Elect Officers

► The Federation of British Rubber and Allied Manufacturers has announced that the Rubber Proofers' Association held its annual general meeting on May 14 in Manchester. At the meeting, the following officers were elected for 1959-1960: *Chairman*, A. N. Haworth (Ferguson Shiers, Ltd.); and *Vice-Chairman*, Arthur Tonge (J. Mandleberg & Co. (Rubber), Ltd.).

Firestone Expansion Program

► Firestone Tire & Rubber Co., Akron, Ohio, has announced a 30 month, $55 million expansion program for its worldwide production facilities. The company's investment in the United States will be over $40 million, with the balance spent abroad. Included in Firestone's plans are two new plants, one in Alcochete, Portugal, which is presently under construction and is scheduled to go into operation late this year. Preliminary work on the second plant, at Orange, Texas, has been completed. This plant, an addition to the Firestone Petrochemical Center, will produce the company's new man-made rubbers, Coral and Diene.

Expansion and modernization programs are under way or scheduled for Firestone's tire plants in Akron, Ohio; Pottstown, Penna.; Memphis, Tenn.; Des Moines, Iowa; Los Angeles, Calif.; and Hamilton, Ontario, Canada. Other United States facilities scheduled for expansion are the synthetic rubber plant at Lake Charles, La.; the plastics plant at Pottstown, Penna.; and the plant at Magnolia, Ark., where defense and industrial products are manufactured. Foreign tire plants in the program include those at Sao Paulo, Brazil; Buenos Aires, Argentina; Valencia, Venezuela; and Bombay, India.

FBRAM President Reviews Term

► Jasper Frankenburg, chairman of Greengate & Irwell Rubber Co., Ltd., reviewed his two years of office as president of the Federation of British Rubber and Allied Manufacturers at a recent meeting of the Council of the Federation. He stated that since the rubber industry is already launched on a period of change, it must learn to accept change and to work with it. If the rubber industry is to remain fully competitive in the face of a growing challenge from the consolidation of economic forces beyond the Channel, he explained, it will need even more cooperation than it has achieved in the past; more money spent on research, development and modernization. Above all, Mr. Frankenburg pointed out, the rubber industry needs to be sure that in its immediate efforts to meet competition both at home and abroad, it does nothing to undermine the sound economic basis on which both individual firms and the industry as a whole must function.

Red Reclaim Adhesive

► St. Clair Rubber Co., Detroit, Mich., has announced the development of 15-287, a new red reclaim adhesive. The company reports that the adhesive has a heat resistance that permits it to pass through paint retouch ovens without failure. According to St. Clair, 15-287 is a general purpose reclaim cement for bonding fibrous material to metal, wood, and plastic.

The newly elected 1959-1960 officers of the Washington Rubber Group. They are, left to right: J. R. Britt (B. F. Goodrich), treasurer; P. Mitton (Army Engineers), vice-president; Arthur W. Sloan (Atlantic Research Corp.), president; and Frank Van Etten Navy Bureau of Ships), secretary.

Washington Group Holds Outing; Elects 1959-1960 Officers

► Over 115 members and guests attended the annual outing of the Washington Rubber Group on June 11, at the Indian Spring Country Club, Silver Spring, Md. The weather was ideal for golf, swimming and Frisbee. The latter, introduced to the group by Everett Holt (Department of Commerce, Ret.), consisted of tossing Frisbee, a plate-shaped plastic discus, for a maximum distance.

Prizes were awarded for golf, bridge and special events. An elegant smorgasbord style dinner with choices of ham, roast beef, seafood Newberg, and chicken chow mein, and a wide variety of hors d'oeuvres and desserts were enjoyed by all in attendance. More than 50 prizes were given to holders of lucky tickets in the drawing for door prizes.

At the conclusion of the outing, the committeemen, who made the outing a success, were applauded. They were: *Chairman*, W. B. Dunkle (Goodyear); *Co-Chairman*, C. C. Miller (Rubber Manufacturers Association); *Prizes*, J. R. Moore (Firestone); *Dinner*, C. R. Collins (B. F. Goodrich); *Tickets*, C. B. Wheeler (Goodyear); *Golf*, I. R. Kolman (Belko Corp.); *Special Events*, E. G. Holt (Department of Commerce, Ret.); and *Bridge*, Mrs. W. B. Dunkle.

The Washington Rubber Group announced the results of the election of its officers for 1959-1960, at its annual meeting on May 4, at O'Donnell's Restaurant, Washington, D. C. The officers for the current year are: *President*, Arthur W. Sloan (Atlantic Research); *Vice-President*, Philip Mitton (U.S. Army Engineers); *Secretary*, Frank M. Van Etten (Bureau of Ships); and *Treasurer*, Jack Britt (B. F. Goodrich). Highlight of the meeting was an educational and entertaining talk given by Dr. and Mrs. Arthur W. Sloan, on their travels to Africa and other parts of the world. Their remarks were profusely illustrated with colored slides.

Named Sales Planning Manager

► M. R. Wilkens has been appointed to the newly created position of sales planning manager of the Industrial Products Divisions for Hewitt-Robins, Inc., Stamford, Conn. He will coordinate marketing efforts on major inquiries with field sales and the manufacturing divisions. Mr. Wilkens, who joined Hewitt-Robins as a sales representative in 1946, was assistant sales manager of the company's Foam Products Division immediately prior to his new appointment. He attended Massachusetts Institute of Technology and the University of Michigan. Before joining Hewitt-Robins, Mr. Wilkens had been associated with Bell Aircraft Corp. and Ryan Aeronautical Corp. in engineering and sales capacities.

Peters Moves Facilities

► Peters Manufacturing Co., after 60 years of manufacturing in Wollaston, Mass., has transferred its operations to the Industrial Village in Cedar Grove, N. J., where it has combined with its parent company, the Bishop Manufacturing Corp. Peters, producer of rubber compounds, rubber and plastic coated cable tapes, and rubber fabrics, with Bishop, will occupy more than 40,000 square feet of factory space, 25,000 feet of which is a newly constructed modern expansion with an additional 2,500 feet of centrally air conditioned office space. Bishop's Research Laboratories have been expanded to include 700 feet of new construction to provide more facilities for research and technical developments of both companies.

Gentro-Jet SAF Rubber

► General Tire & Rubber Co., Akron, Ohio, has introduced a new type of rubber for use in tires which consists of a special blend of synthetic and ultra-fine carbon black. The new rubber, a styrene-butadiene black masterbatch type called Gentro-Jet SAF, is manufactured at the company's synthetic rubber facility at Odessa, Texas. It is made by a high energy process which fuses a new ultra-fine carbon black with rubber while the rubber is at the latex or liquid stage. The new carbon, called SAF (super abrasion furnace), is 30 per cent finer in particle size than blacks normally used in tire tread compounds.

The company states that it is the first major manufacturer to add a carbon black of such small particle size to rubber with any degree of success. Previously, the poor dispersion obtained with conventional mixing methods resulted in cracking of the tread in service, according to General Tire. In General Tire's process, the finer particle carbon black is "steam-whipped" with great force and turbulence into the latex to produce a perfectly balanced dispersion of the carbon. The blend is then coagulated and dried. Tires utilizing the rubber have undergone stringent road tests at San Antonio, Texas, as well as exhaustive lab testing at the company's Akron research headquarters and are said to have shown a 30 to 35 per cent increase over normal tread wear.

Rubber Expansion Joint

► A rubber expansion joint developed by B. F. Goodrich Co., Akron, Ohio, for highways, airport runways and bridge approaches, is in use on the recently opened new Prospect Street bridge in Akron, Ohio. The expansion joint was provided by Goodrich, free of charge, as an experiment. Seven inches wide and extending across the width of the bridge, the rubber joint permits the normal expansion and contraction of the structure caused by weather, while the rubber joint remains flush with the surface, and still seals the roadway from water seeping through.

Buys Thermoboot Trade Name

► Bristol Manufacturing Corp., Bristol, R. I., has announced that the company has purchased outright the trade name Thermoboot, which was formerly owned by Techno Efficiency Council, Brooklyn, N. Y. The name will appear on all high grade insulated waterproof footwear manufactured by the company. Bristol Manufacturing, working with representatives of Techno Efficiency, developed the original Thermoboot for use by the armed forces in combatting frostbite and cold weather conditions in Korea, the company states.

Archibald T. McPherson

Awarded Service Medal

► Dr. Archibald T. McPherson has been awarded the U. S. Department of Commerce Gold Medal for Exceptional Service, in recognition of his work in improving the effectiveness of standardization activities of the National Bureau of Standards, and of his major contributions to the development of young scientitsts and engineers. During the World War II rubber shortage, Dr. McPherson served as a technical advisor on the Rubber Survey Committee. He coordinated Bureau activities in rubber research and was instrumental in the application of new techniques, such as refractometry and mass spectrometry, in the accurate determination of the composition of monomers and polymers. He was called upon to evaluate many proposed emergency sources of rubber, and developed a plan for the grading of wild rubber from new or little known sources.

Dr. McPherson received his B.A. degree from Trinity University and his M.S. degree from the University of Texas in 1916. In 1923, he received his Ph.D. in chemistry from the University of Chicago. During 1919 and 1920, he was professor of chemistry at Ewing Christian College in India. He came to the National Bureau of Standards in 1918, and became chief of the Rubber Section in 1930. From 1943 to 1951, Dr. McPherson was chief of the Organic and Fibrous Materials Division, supervising Bureau research in the fields of organic plastics, dental materials, rubber, textiles, leather, and paper technology. The major part of his work has been concerned with rubber research, including investigations of the electrical, optical, and thermodynamic properties of rubber and research in rubber technology.

Dr. McPherson has published many research papers on such subjects as the change in volume of rubber during stretching; methods for the purification of, and the characteristics of, purified rubber; and the dielectric properties of rubber. He is past president of the Washington Academy of Sciences, and a Fellow of the American Physical Society.

Linde Expands Plant Capacity

► Linde Co., a division of the Union Carbide Corp., New York, N. Y., plans to increase six-fold the production of synthetic crystalline zeolites at its Tonawanda, N. Y. plant. The firm was recently granted two U. S. patents covering the composition and manufacture of these adsorbents, which are designated Molecular Sieves. The patents cover methods of manufacture and disclose the manner in which Linde's zeolites are being synthesized. U. S. Patent Number 2,882,243 covers two varieties of materials being marketed as Linde Molecular Sieves Types 4A and 5A.

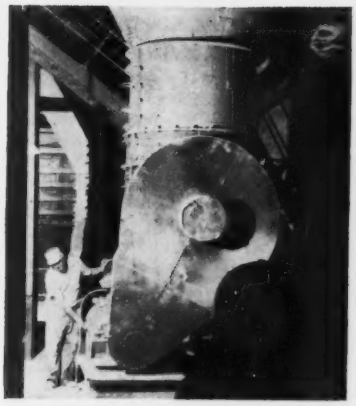
Principal uses of these types include the drying of refrigerants and natural gases and the purification or separation of complex hydrocarbon mixtures. They are also employed in Linde's patented process for the purification of argon and to sweeten various gases. The other patent, Number 2,882,244, covers materials being marketed by Linde as Molecular Sieve Type 13. This type is being offered as a high capacity dessicant for drying air and is also used in the company's line of chemically loaded Molecular Sieves for curing rubber and plastics.

Phillips Names Two

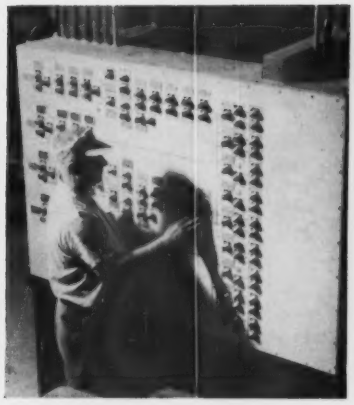
► Phillips Chemical Co., wholly owned subsidiary of Phillips Petroleum Co., Bartlesville, Okla., has named W. C. Douce to the newly created position of assistant director of its Chemicals Sales Division, and R. N. Hendriksen to the newly created post of southeastern district manager for the division. Mr. Douce joined Phillips in 1942 after graduating from the University of Kansas. In 1956, he became district sales manager of the firm's New York district Plastics Sales Division. In his new position, he will be headquartered in Bartlesville. Mr. Hendriksen graduated from the University of Michigan and joined Phillips in 1953. He has been a technical sales representative at Trenton, N. J., since 1954. As southeastern district manager, he will maintain his headquarters in Trenton.

Appoints West Coast Distributor

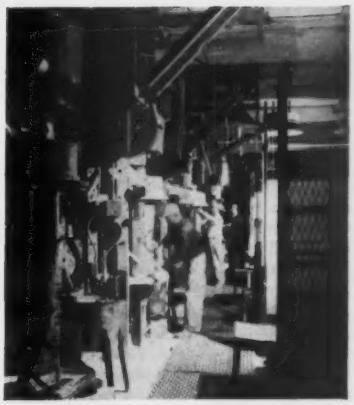
► Nuodex Products Co., a division of the Heyden Newport Chemical Corp., New York, N. Y., has announced the appointment of Hastings Plastics Co. as distributor for the complete line of Nuodex Certified organic peroxide catalysts and accelerators to the polyester consuming industry on the West Coast. Hastings Plastics is a major source of supply for plastic chemicals to West Coast manufacturers. Norry Hastings, general manager of Hastings, will work closely with Knox Price, Nuodex regional sales manager, who has offices in Los Angeles and San Francisco.



One of the many holding bins at the company's Pennsylvania plant. Each bin has a capacity of 20 tons or more of zinc oxide.



General operating panel which controls all mechanical movements of zinc oxide throughout the system to the surge bins above the packing machines.



Various grades of zinc oxide are packed in 50 pound bags for shipment to customers. The bin over the packer is operated automatically by the packing machine.

New Jersey Zinc Co. Modernizes Operations

► New Jersey Zinc Co., New York, N. Y., has redesigned and modernized its method of collecting, screening and packing in order to achieve greater efficiency in plant operations. Production of zinc oxide on traveling grate furnaces at that plant has, for many years, been a fully continuous and automatic operation. Enlarged from time to time and equipped with new and improved devices, the furnaces today are said to represent the ultimate in efficiency in modern zinc oxide manufacture by the American process.

Formerly handled manually, the process for collecting, screening and packing the pigment has been converted to a mechanical operation. After the pigment is collected in the bag room, it is moved by lift trucks to hoppers from which it is elevated and deposited into a group of large storage bins. From each storage bin, zinc oxide is then discharged into several surge bins which release the pigment at suitable speeds through screening machines into the packing machines. The zinc oxide in each of the storage bins is automatically sampled and grade checked and approved prior to release into the smaller bins. When a storage bin is emptied it may be refilled with another type of zinc oxide and the testing and packing procedure repeated.

Packing is accomplished in a number of packing units, each consisting of one of the surge bins, a screening machine and a packing machine. The only hand labor in the new system is that connected with the machine packing and weighing of the pigment.

In addition to stepping up the efficiency of the system, the changes have resulted in improved storage, shipping and quality control.

Borden Plant Expansion

► Borden Chemical Co., New York, N. Y., has announced that it will soon begin the installation of additional new manufacturing machinery and transfer some machinery from its Santa Barbara, Calif., location to its recently expanded Compton, Calif., plant. Borden will produce extruded vinyl garden hose at the Compton location. Industrial extrusion operations, involving electrical and aircraft insulation and pharmaceutical tubing, will remain in Santa Barbara, the company states. The Compton plant was originally built by Borden, on a 7½ acre tract, in 1951 for the production of resorcin. Subsequent expansions added facilities for the production of urea and phenolic resins, polyvinyl acetate emulsions and casein products. According to the company, it plans to begin production of several as yet unannounced new products at the Compton plant. In Santa Barbara, those portions of the plant buildings being vacated by Borden, are being taken over by Raytheon Mfg. Co.

Scotchcast Silicone Rubber Foam

► Minnesota Mining and Manufacturing Co., St. Paul, Minn., has announced the development of a silicone rubber foam said to have excellent adhesion to metals and plastics, and cures at room temperature. The new foam-in-place resin, called Scotchcast brand foam resin No. XR-5017, is expected to be used for coating circuit boards and terminal panels; encapsulation of audio and pulse transformers; cushioning for sensitive components; coating sensitive core materials such as toroids to absorb shrinkage stresses of casting resins; coating fixtures for holding objects during aerated bed coating; and other applications where energy absorbing protection is required over a temperature range of from —100°F to 500°F. According to 3M, XR-5017 can adhere to metals, glass and plastics without use of a primer, with the foam rupturing before its bond with the materials is broken. A two-part material, it can be foamed in place at room temperature or cured at 250°F. for a superior bond, the company states.

Vibration Manual for Engineers

► The Office of Technical Services, U. S. Department of Commerce, has released a U. S. Navy publication containing formulas useful to design engineers in minimizing mechanical vibration difficulties. The manual was prepared by the Structural Mechanics Division of the U. S. Navy's David Taylor Model Basin and is a revision of an earlier manual with the same title issued in 1944. The main purpose of the manual is to expedite calculations required by the practicing engineer. Most formulas conform with a notation based on the inch-pound-second system of units. They are presented in case form and illustrated and explained. The volume, PB131785, *A Vibration Manual for Engineers (Second Edition)*. R. T. McGoldrick, Structural Mechanics Division, David Taylor Model Basin, U. S. Navy, was published in December 1957, and may be ordered from the Office of Technical Services, U. S. Department of Commerce, Washington 25, D. C. It contains 32 pages, price $1.

Phillips Cis-4 Rubber

► Phillips Chemical Co., Bartlesville, Okla., has announced that its *Cis*-4 rubber is now available from its semi-commercial plant at a development price of 35c a pound, in 5,000 pound minimum lots. *Cis*-4 is Phillips trademark for its *cis*-polybutadiene synthetic rubber. Tires made from *Cis*-4 or from mixtures of *Cis*-4 with other kinds of rubber have been road tested nearly 1.5 million miles since the new rubber was first announced in April 1956. According to the company, road tests show passenger tires with all-*Cis*-4 treads averaged 36 per cent greater mileage than comparable tires made with cold rubber.

Truck and passenger tire treads made from a 50-50 blend of *Cis*-4 and natural rubber have averaged 14 per cent superior to control tires of all-natural rubber. *Cis*-4 tires also are superior to conventional cold rubber treads in traction on ice and snow, the company reports. Outstanding properties of *Cis*-4 besides longer treadwear and better traction, said Phillips, include high resilience superior to that of natural rubber, and resistance to oxidation and blowout. The company claims that blends containing 50 to 75 per cent *Cis*-4 with natural rubber process without difficulty and give tire treads with lower running temperature than all-natural rubber controls.

McNeil Splits Stock

► Shareholders of the McNeil Machine & Engineering Co., Akron, Ohio, have approved a two for one split of common stock, increasing the number of outstanding shares from 596,479 to 1,192,958. The shareholders also voted an increase in the number of shares of the company to 2,000,000 shares with no par value. The company previously had been authorized to have 750,000 shares of $5 par value. The board of directors plans to declare an initial quarterly dividend of 25c per share on the split shares, payable in September. This will represent a 25 per cent increase. Previous dividend would have amounted to 20c (based on the split share). Each share of preferred stock will be convertible, if the holder wishes, into two shares of common.

Emery Plant Expansion

► Emery Industries, Inc., Cincinnati, Ohio, has announced plans for a $6 million plant expansion project. According to the company, new construction at its Cincinnati plant will increase several fold the existing capacity for production of azelaic and pelargonic acids from oleic acid by ozone oxidation. The expansion program includes plans to increase esterification capacity for Emery's line of Plastolein plasticizers, and Emolein diesters for jet engine lubricants, the company states.

Joseph E. Weldon

Goodyear Names Representative

► Goodyear Tire & Rubber Co., Akron, Ohio, has appointed Joseph E. Weldon as Boston district sales representative for its Chemical Division. Mr. Weldon will be concerned primarily with the division's sales of latices and resins to the textile and paint industries. He holds a B.S. degree in chemistry from Lowell Technological Institute, and has had extensive experience in the compounding and coatings industries. Mr. Weldon is a member of the American Association of Textile Chemists and Colorists.

Bloch Named President

► Western Petrochemical Corp., New York, N. Y., has announced that Maurycy Bloch has been named president of the company. Mr. Bloch formerly was vice-president and general manager of Warwick Wax Co., subsidiary of Sun Chemical Corp., whose assets were recently acquired from Sun by Western Petrochemical. It was announced that Warwick will operate as a division of Western, with Mr. Bloch serving as chief executive officer. Mr. Bloch joined Warwick in 1944. In 1946 he became midwestern sales manager and two years later was made national sales manager. In 1949 he was named vice-president and, in 1950, general manager and director of the subsidiary.

10,000 Gallon Pillow Tank

► Goodyear Tire & Rubber Co., Akron, Ohio, has announced the development of a 10,000 gallon capacity Pillow Tank, manufactured by its Aviation Products Division, used for storing fuel. According to reports, the tanks can also be used to transport virtually all types of liquids on trucks, railroad cars and barges, and are constructed in sizes up to 200,000 gallon capacities. The containers are made with rubber coated nylon.

Highway Rubber Expansion Joints

► B. F. Goodrich Co., Akron, Ohio, has announced that rubber sandwiches between slabs of concrete will be installed on an experimental stretch of the Baltimore-Harrisburg Expressway now under construction at Hereford, Md. The Expressway installation will mark the first highway use of a new rubber expansion joint developed by B. F. Goodrich Industrial Products Co. According to the company, the new product is designed to take advantage of rubber's flexibility in order to eliminate rhythmic road shock which motorists encounter on many highways. Under supervision of the Division of Road Design, Maryland State Road Commission, five sets of rubber expansion joints will be installed, extending completely across each lane of the dual highway. The 13 inch wide joints will be anchored in the concrete for a watertight seal. Originally developed for the Jones & Laughlin Steel Corp.'s new pre-stressed highway, the rubber expansion joint is also being considered for use on airport runways, the company states.

Goodrich Names Two

► B. F. Goodrich Co., Akron, Ohio, has announced that Dr. Louis E. Trapasso has joined the Chemical and Plastics Research Department at its Research Center in Brecksville, Ohio. The company has also announced that T. George Hatch has been appointed manufacturing manager of the Molded Goods Department of B. F. Goodrich Industrial Products Co. Dr. Trapasso received a B.S. degree from City College of New York in 1954 and a Ph.D. in organic chemistry from the University of Maryland in June, 1959. Mr. Hatch, manager of the company's Cadillac, Mich., plant for the past seven years, joined Goodrich 37 years ago as a factory employee. He was named a general foreman in 1946 and went to Cadillac as plant manager in 1952.

Plans European Unit

► Columbian Carbon Co., New York, N. Y., will build a $6 million carbon black plant near Milan, Italy, to supply the European Common Market area. To have production facilities for over 60 million pounds of carbon black annually, the facility is expected to be in full operation by early 1961. The unit will operate under the company name of Columbian Carbon Europa and will produce three grades of carbon including two tread blacks and one carcass black. Chairman of the board of directors for the new company is E. B. Brooks, vice-president in charge of the parent company's Carbon Black and Pigment Division.

U. S. Rubber Licenses Ford

► U. S. Rubber Co., New York, N. Y., has licensed the Ford Motor Co. to use a method for continuously laminating decorative and durable vinyl plastic sheet to metal. Ford is the first automotive company to be licensed to use the laminating technique, called the Marvibond Process and developed in 1953 by Naugatuck Chemical. Ford currently uses vinyl-coated steel extensively in the 1959 Thunderbird interior and may extend use of vinyl-to-metal laminates in other model lines. The process is said to offer a combination of economy, structural strength and beauty.

Vinyl film for laminate use will be made in the Ford Motor chemical products plant in Mt. Clemens, Mich., which was activated in the summer of 1958 to produce vinyl automotive trim. Essentially, the process is a method for continuously bonding metal with semi-rigid plastic sheet to give the metal an attractive and durable finish before it is formed. Then it can be shaped and fabricated with virtually any metal-working technique without damaging the plastic facing. The process has now been licensed to 17 American manufacturers and in 27 foreign countries. Annual, world-wide production of the laminate is expected to reach 140,000,000 square feet by 1960.

A-D-M Develops Admex 770

► A new polymeric plasticizer, Admex 770, that is said to impart a high degree of permanence to PVC calendered film and sheeting has been developed by Archer-Daniels-Midland Co., Minneapolis, Minn. According to the company, Admex 770 is a primary plasticizer with good low temperature flexibility and excellent resistance to extraction and migration. It is very light in color, has a very low odor level, and does not crystallize or form a precipitate when exposed as a liquid to low temperatures, the company states. Admex 770 is recommended for use in organosol cloth coatings and in calendered film and sheeting suitable for electrical tape and upholstery applications; in pressure sensitive tape and vinyl-metal laminates; and in new refrigerator gasket compounds. Archer-Daniels-Midland states that its performance is far in excess of UL minimums, making it suitable for 105°C. wire coating applications.

Opens Cable Research Laboratory

► Anaconda Wire and Cable Co., Hastings-on-Hudson, N. Y., has announced the opening of its new extra high voltage research laboratory at Hastings-on-Hudson. The new laboratory facilities cost more than $1,750,000, and are composed of an assembly of precision equipment for research and testing of extra high voltage cable and accessory designs.

H. R. Wall

Elected President

► Continental Oil Co., Houston, Texas, has announced that H. R. Wall has been elected president and chief executive officer of Continental Carbon Co. Mr. Wall, formerly general manager of Continental Oil's Transportation and Supplies Department, succeeds Robert I. Wishnick who has been elected to the newly created position of chairman of the board of Continental Carbon Co.

Mr. Wall received a B.S. degree in electrical engineering in 1934 from the University of Colorado, and joined Continental Oil at its Denver, Colo., refinery in 1935. He transferred to the Ponca City, Okla., refinery in 1937 as a mechanical inspector and fuel economist. He became assistant superintendent of the company's Lake Charles, La., refinery in 1942 and in 1948 was named superintendent of the refinery. In 1950 he returned to Ponca City, served as refinery superintendent for two years before transferring to Houston in 1954 as manufacturing manager of the Southern and Southwestern regions. In 1957 he was named general manager of transportation and supplies.

Jefferson Promotes Luger

► John M. Luger has been appointed to the newly created position of assistant to the executive vice-president for the Jefferson Chemical Co., Inc., Houston, Texas. His major responsibility will be the preparation of studies on the various areas of management. Mr. Luger joined Jefferson Chemical in 1955 as administrative assistant to the sales manager and for the past two years has been a sales representative in the Cleveland, Ohio, sales district. He was graduated in 1951 from the Massachusetts Institute of Technology with a B. S. degree in chemical engineering. In 1953, he received his master's degree in business adminstration from the Harvard Business School. From 1953 to 1955, Mr. Luger served as an officer in the U.S. Air Force at Wright-Patterson AFB, Ohio, in the Air Material Command.

Thiokol Appoints Two

► Thiokol Chemical Corp., Trenton, N. J., has appointed Dr. W. M. Mebane, formerly manager of the Redstone Division, as secretary of the corporation. The company has also announced that J. W. Wiggins, previously assistant divisional manager at Redstone, has been named to succeed Dr. Mebane as manager of the Redstone Division in Huntsville, Ala. Dr. Mebane's undergraduate training was in chemical engineering and he received a B.S. degree in that field in 1925. He earned an M.S. in industrial chemistry in 1926 and a Ph.D. in physical chemistry in 1929, at the University of North Carolina.

Dr. Mebane has held instructorships at the University of North Carolina, the Citadel and at Asheville Junior College. He was professor of chemistry at Middle Tennessee State College from 1930 to 1942. Mr. Wiggins graduated from Purdue University in 1942 with a B.S. degree in mechanical engineering. He joined Thiokol in 1951 as project engineer for the development of the propulsion unit for the Falcon missile built by Hughes Aircraft Co. He progressed to chief engineer and then to assistant general manager of the Redstone Division.

Monsanto Briquette Accelerators

► Monsanto Chemical Co., St. Louis, Mo., has announced the development of a briquette form of dry chemicals for rubber processing. The chemicals, called Santocure and Santocure NS, are delayed action sulfenamide accelerators, are pressed into miniature, pillow-shaped briquettes measuring only a half-inch in length. Larger than the usual industrial pellets but smaller than standard briquettes, the new dry form is reported to be exceptionally free flowing for maximum handling and weighing ease, both in automatic weighing machines and older types of equipment. Monsanto reports that the briquettes handle and disperse well during normal Banbury operation, and their apparent density is estimated to be 20 per cent lower than that of the powders.

New Synthetic Rubber Compound

► Firestone Tire & Rubber Co., Akron, Ohio, has announced the development of a new synthetic rubber compound which will give motorists 5,000 extra miles for every 30,000 miles of driving. According to the company, tires built with X-99 tread rubber combine the rare characteristics of a smoother, softer and quieter ride. Rubber X-99 has been approved for immediate use in the firm's top tire, the Premium Quality, the company states. The new tread stock resulted from the discovery of a new polymer and the development of the most advanced compounding techniques in the rubber industry, the company added.

West Coast News

► R. W. Maney, vice-president and general manager of the western region for the Goodyear Tire & Rubber Co., recently celebrated completion of his 30th anniversary with the firm, at which time he was presented with a company service pin. Mr. Maney joined Goodyear in 1929 after graduating from the University of Kansas. He served apprenticeship in both sales and production and during the 1930's he filled several assignments in sales and production. In 1940, Mr. Maney was named assistant to the superintendent of Goodyear's plant 1 in Akron and the next year, he was made superintendent. After an assignment as factory personnel manager in 1942, he was transferred to the company's Gadsden, Ala., plant as general superintendent. He returned to the Akron factory in 1944 as superintendent of Plants 1 and 2 and was appointed manager of the Los Angeles plant in 1950. In 1956, he was appointed to his present position. Mr. Maney is the president of the Los Angeles Area Council and Boy Scouts of America and a member of the Los Angeles Rotary Club, the Los Angeles Country Club and the California Club.

► Three scientists have joined the technical staff of the Shell Development Co. Emeryville (Calif.) Research Center, including Dr. Robert S. Brown, an engineer in the Chemical Engineering Department; Dr. Olvi L. Mangasarian, a mathematician in the Applied Mathematics Department; and Dr. George A. Boswell, a chemist in the Organic Chemistry Department. Mr. Brown received his B.S. degree in chemical engineering at Princeton University in 1954. He took graduate work at the University of California and obtained his Ph.D. degree in chemical engineering this year. Mr. Mangasarian attended Princeton University, receiving his B.S. degree in civil engineering in 1954 and his M.S. degree in Applied Mechanics in 1955. He studied further at Harvard University and obtained his Ph.D. degree in applied mathematics this year. Mr. Boswell attended the University of California where he received his B.S. degree in chemistry in 1956. He did graduate work there and obtained his Ph.D. degree in organic chemistry this year.

► Leonard E. Budnick has been appointed plant manager of the Long Beach, Calif., plant of the Ohio Rubber Co., division of Eagle-Picher Co. Mr. Budnick joined the Willoughby plant of Ohio Rubber in 1936 as an accounts payable clerk. In the Accounting Department over a period of years, he progressed to accounts payable supervisor and later was made credit manager of Ohio Rubber. During this time, he was extremely active in the affairs of the Foreman's Club and the Credit Union of the Willoughby plant.

In 1946, Mr. Budnick was elected assistant secretary and assistant treasurer of Ohio Rubber Co. of California, and during the past 12 years, has contributed much toward the growth of the California plant. Previous to his association with Ohio Rubber, Mr. Budnick was connected with the Inland Division of General Motors in Dayton, Ohio.

► John G. Augenstein, who was formerly with the Rubatex Division of Great American Industries, Inc., has joined the production staff of the Kirkhill Rubber Co. He will be working primarily on foam projects.

► Gene Gador, previously of the Oliver Tire & Rubber Co., has joined the sales staff of the B. E. Dougherty Co. and will operate out of the San Francisco office.

► Wally Jensen has been appointed purchasing agent for the Burke Rubber Co., San Jose, Calif., succeeding Carl Ebert.

► Rubber Machinery Co. has been sold by Cal Simons to N. S. Von Rohr and J. C. Johnson. Mr. Simons will not be a part of the new organization.

► Mort Goldman, who was formerly with Regency Rubber Products, is now with Kraco Corp.

► Julius Bittera, formerly with American Latex Products Corp., is now in the Research and Development Labs. of Sierra Talc & Clay Co.

► Homer Neptune, previously with H. M. Royal, has joined the Purchasing Department of the W. J. Voit Rubber Co.

United Carbon Moves Offices

► United Carbon Co., Inc., Charleston, West Va., has announced that its Chicago offices have been moved to the Le Mar Building, 47th Street and Willow Spring Road, La Grange, Ill. C. W. Baldwin is the firm's Chicago district manager and James Dunne is sales assistant.

General Electric Names Dugan

► Walter J. Dugan, Jr., has been appointed manager of rubber market development for the Silicone Products Department of General Electric Co., Waterford, N. Y. Mr. Dugan will direct market research, sales planning and technical service for the department's silicone rubber product line. He graduated from Rensselaer Polytechnic Institute in 1943 with a B.S. degree in chemical engineering. After serving in the U. S. Navy during World War II, he became an instructor in chemistry and chemical engineering at Rensselaer and received his M.S. degree in chemical engineering in 1948. In 1948, he joined the silicone operations at General Electric.

Since that time Mr. Dugan also has served as a product engineer, manager of product engineering for silicone fluids, emulsions and specialties, and marketing specialist for industrial products sales development. Prior to the present appointment, he was manager, sales development for the Silicone Products Department. Mr. Dugan is a member of the American Chemical Society, Armed Forces Chemical Association, Society of Sigma Xi, and the Rensselaer Polytechnic Institute Science Development Council.

New Seal Design

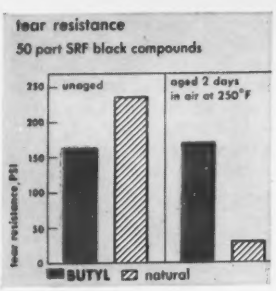
► Minnesota Rubber Co., Minneapolis, Minn., has announced the development of a new seal design for use in special applications subject to extreme extrusion forces. The seal, called Quad-Bak, is a variation of the company's basic Quad-Ring design. According to the company, the Quad-Ring, a four-lobed seal, gave outstanding service, but research revealed that performance under special conditions, in which extreme extrusion forces acted in one direction only, could be improved by making one side convex. This strengthened the seal and eliminated extrusion damage to the lips, the company states. According to reports, the Quad-Bak has been in use as a power transmitting seal in aircraft brakes.

General Tire Plans Research Unit

► General Tire & Rubber Co., Akron, Ohio, plans to erect a multi-million dollar research center on a 40 acre site located three miles east of the firm's main offices. First phase of the project is to cost an estimated $1.5 million. The research building is to be constructed across Gilchrist Road from General Tire's 400,000 square foot warehouse, which was opened in 1953. With construction expected to start later this year, the research center has been designed so it can be expanded as the need arises. General has also leased the second floor of the new IBM building in Akron for use by various office operations.

ENJAY BUTYL

RUBBER FOR RESISTANCE TO TEAR AND ABRASION



Enjay Butyl offers the highest aged tear strength of any rubber. Even after long exposure to heat, oxygen and ozone, Butyl retains nearly all its original tear and flex resistance...keeps its stretch without tearing. And Butyl's inherent toughness offers rugged resistance to abrasive wear. Butyl is the preferred rubber and proven superior in such applications as conveyor belts, hoses, heavy-duty off-the-road truck tires, and other mechanical goods.

Butyl also offers...outstanding resistance to chemicals, weathering, sunlight, heat, and electricity...superior damping qualities...unmatched electrical properties and impermeability to gases and moisture.

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Canadian News

► Polymer Corp. Ltd., Sarnia, Ont., has announced the appointment of G. Redlich to the newly created position of manager of economics and development. This position has been established in order to coordinate the company's business development and planning effort with its existing staff services. The move involves the reorganization of the Economics and Yield Department.

D. J. Wormith has been appointed manager of the Planning and Development Department. This new department will be concerned with business development and will assist in the planning of Polymer's growth and expansion in addition to providing many of the services previously handled by the Economics Section.

W. R. Carson has been named manager of the Operations Analysis Department. In addition to services formerly provided by the Yield Section, this new department will undertake economic analysis and evaluations associated with current operations. A special Project Section will be established to handle specific projects which have passed the preliminary development stage.

Mr. Redlich joined Polymer in 1942 and served in various technical and staff capacities until 1951, when he was appointed manager of the Economics and Yield Department. Mr. Wormith joined Polymer in 1942 and served as a process engineer and economic analyst prior to his appointment as chief of the Economics Section in 1951. Mr. Carson joined the company in 1943 as a process engineer. In 1949, he was appointed yield controller, which position he has held up to his present appointment.

Polymer has also announced the appointment of David Anderson as production superintendent for petrochemicals. A graduate of the University of Toronto in chemical engineering, Mr. Anderson joined Imperial Oil Ltd. in 1942 and was transferred to St. Clair Processing Corp. in 1943 as an instrument foreman. When St. Clair Processing was absorbed into the integrated Polymer organization, he remained with the synthetic rubber company. In 1946, he transferred to the Production Division. Mr. Anderson is a member of the Association of Professional Engineers of Ontario.

► J. C. R. Warren has been appointed coordinator of research and development for the Dominion Rubber Co. Ltd. In this position, Mr. Warren will coordinate all research and development activities of the various company divisions and will be responsible for its research laboratory at Guelph, Ont., where he will make his headquarters. Before joining the company, he was associated with the Ontario Research Foundation. Born in Hamilton, Ont., Mr. Warren has a B.A. in Honors chemistry from McMaster University and completed further studies at the Universities of Michigan and Toronto. He is the author of several papers and has been granted 19 patents in the chemical field.

The company has also announced the appointment of James C. E. Fuller as plastic resins sales manager of its Naugatuck Chemicals Division. He was formerly in charge of Naugatuck's market development program. Mr. Fuller graduated from Ontario Agricultural College in 1948 with a B.S.A. degree in chemistry and in 1955, he was awarded his M.B.A. in business administration by the University of Western Ontario. In his new position, Mr. Fuller will be responsible for the Canada-wide sales of Vibrin polyester resins, Vibramix polyester premixes, Kralastic A. B. S. Copolymer and Marvinol vinyl resins. He will make his headquarters at the Naugatuck offices in Elmira, Ont.

► Armand Chaput, who was formerly associated with the Plastics and Resins Division of Monsanto Canada, Ltd., has been appointed sales representative for the Borden Chemical Co. (Canada) Ltd. Mr. Chaput will make his headquarters in Montreal and will be responsible for the sale of Borden's full line of industrial adhesives, coatings, building materials, resins and chemicals in the eastern Ontario and Quebec markets. He is a graduate in business administration from Sir George Williams College in Montreal.

► Firestone Tire & Rubber Co. of Canada Ltd., has announced the appointment of A. C. Jemison as sales representative for industrial products in the Manufacturers' Sales Division. A native of Windsor, Ont., Mr. Jemison majored in industrial engineering at the Detroit Institute of Technology and brings 12 years of experience in the automotive and rubber industry to his new post.

► J. B. Preston has been named sales manager for the Seiberling Rubber Co. of Canada Ltd. Mr. Preston, who has been with Seiberling for 21 years, is well known to the tire trade.

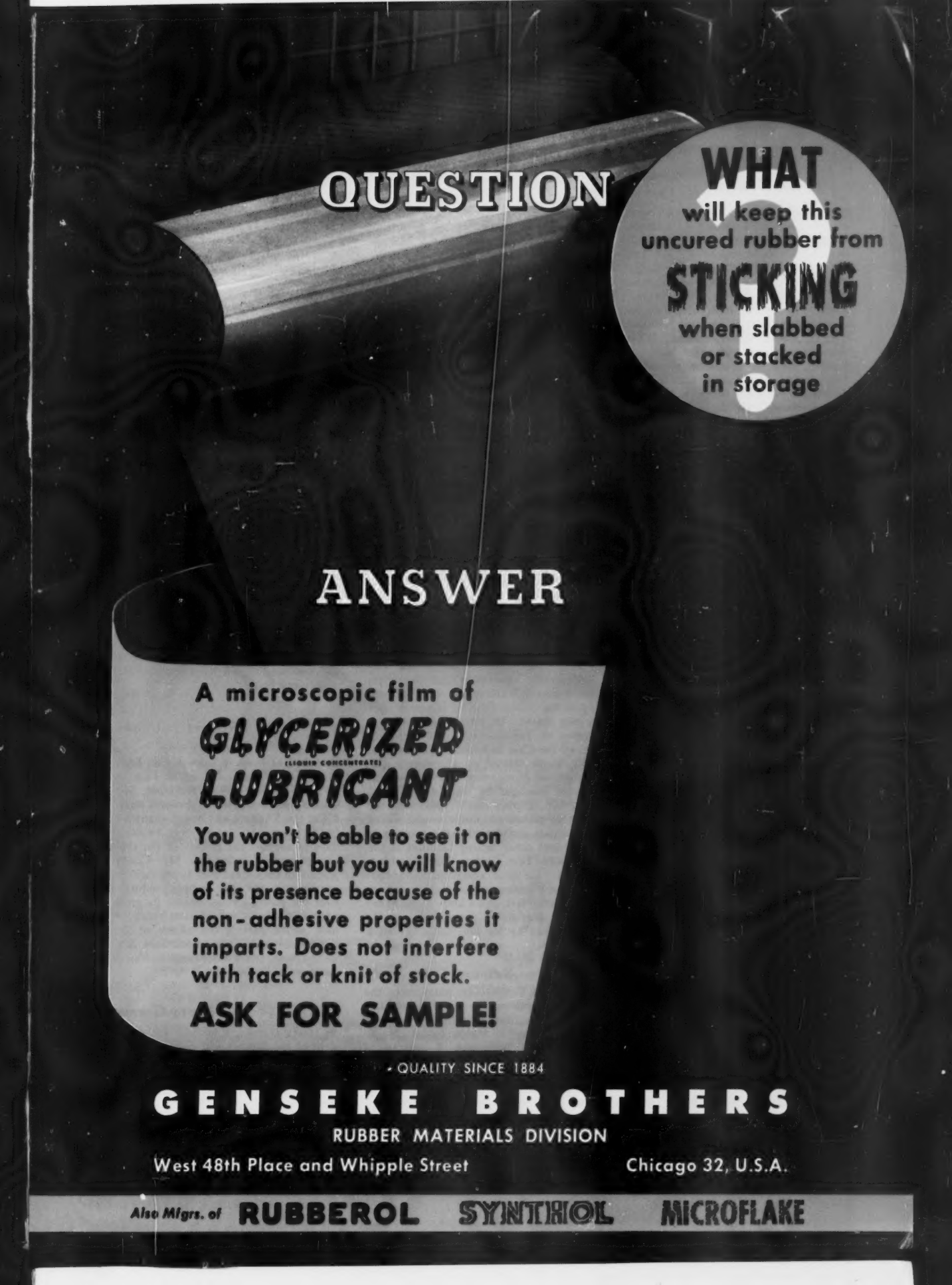
► Robbins Floor Products, Inc., Tuscumbia, Ala., has formed a new corporation for the manufacture and distribution of Robbins vinyl and rubber tile in Canada. To be known as Robbins Floor Products of Canada, Ltd., the firm will be located in Granby, Ont., where a manufacturing plant and offices are presently under construction. The new plant is expected to go into operation about October 1. Poncet Davis, Jr., president of the American corporation, will also serve as president and chief executive officer of the Canadian firm. Thomas A. Doherty is vice-president in charge of sales; Ervin Poetter is vice-president in charge of production and also serves as assistant secretary. Other officers and directors of the new corporation are Glenn A. Taylor, vice-president, and Homer E. Rutledge, vice-president and treasurer. The firm also plans to construct manufacturing facilities in France in cooperation with the Ste' Chimique de Gerland of Paris. To be located in Lyons, the unit is scheduled for completion in early fall.

► Goodyear Tire & Rubber Co. of Canada plans to build a $4,500,000 tire plant in Medicine Hat, Alberta. Construction is expected to start immediately on the one story, self-contained factory which will produce passenger car, truck and farm tires for the western Canada market. The company states that tires will be rolling off the assembly line by September, 1960. The company has also purchased mineral rights to a natural gas well adjacent to the property which will supply the plant with fuel.

► Seiberling Rubber Co. of Canada Ltd., has appointed B. K. Ziemann as manager of marketing and sales promotion. Mr. Ziemann brings to his appointment a wide experience in the tire industry and before joining Seiberling did considerable promotion work for Courtaulds (Canada) Ltd. in Canada and the United States, introducing their new Tyrex vicose tire cord.

► Firestone Tire & Rubber Co. of Canada, Ltd., has announced that construction has started on its multi-million dollar tire manufacturing plant located on a 50 acre site in Calgary, Alberta, Canada. According to the company, this will be the first tire manufacturing plant in western Canada. The new Calgary plant is part of Firestone of Canada's expansion program which also will include modernization of its Hamilton, Ontario, tire plant. Production plans call for a full line of passenger, truck bus, farm and implement tires, and manufacturing operations are expected to begin by the Fall of 1960.

► Pitt Consol Chemical Co., Newark, N. J., has announced the appointment of the R. M. Ferguson Co. as its sales representative to the Canadian rubber industry.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Obituaries

Ralph H. Tyrrell

► Ralph H. Tyrrell, retired vice-president of Stalwart Rubber Co., Bedford, Ohio, died on July 30 in Cleveland, Ohio. He was 76 years old. Mr. Tyrrell was born in 1883 at North Ridgeville, Ohio, and at the age of 16 joined the Mechanical Rubber Co. in Cleveland. Mr. Tyrrell rose rapidly in the organization until he reached the position of general superintendent. When the company was purchased by U. S. Rubber, and its operation moved to New Jersey, Mr. Tyrrell resigned and joined the National Screw & Mfg. Co. of Cleveland. He later worked for the Aetna Rubber Co., the Ohio Rubber Co. and with the R. H. Schwartz Rubber Co. In 1932, Mr. Tyrrell became associated with the Stalwart Rubber Co., and soon became chief chemist, vice-president and director of the company. Mr. Tyrrell retired in 1957, but continued to serve the company in a consulting capacity. He is survived by his wife and two sons.

J. Gerber Thompson

► J. Gerber Thompson, treasurer for the B. F. Goodrich Industrial Products Co., died on June 10 after suffering from a heart attack. He was 51 years old. Mr. Thompson joined Goodrich in 1929 as an accountant after graduating from Ohio Wesleyan University. In 1933, he was moved up to assistant manager of the Accounts Payable Department and in 1939, he was promoted to department manager. He was assigned to contract termination and renegotiation of government contracts in 1943 and became manager of accounting manufacturing in 1952. Mr. Thompson was named treasurer of Goodrich Industrial Products in 1953. Mr. Thompson was a member of the National Association of Cost Accountants and the Government Contract Accounting Committee of the National Security Industrial Association. He is survived by his wife and a son.

David Ross

► David Ross, assistant vice-president and traffic manager of the General Cable Corp., Bayonne, N. J., died on March 12 at the Alexian Brothers Hospital after a brief illness. He was 59 years old. Mr. Ross joined General Cable's traffic staff in 1945. He was a member of the Traffic Club of New York, the Association of Interstate Commerce Commission Practitioners, the National Electrical Manufacturers Association, and the Transportation Square Club of New Jersey. Surviving are his wife and daughter and a son.

Kenneth E. Kress

► Kenneth E. Kress, supervisor of methods development in the analytical laboratory at Firestone Tire & Rubber Co., Akron, Ohio, died on July 15 in Akron after a long illness. He was 36 years old. Born in Drake County, Ohio, Mr. Kress was graduated from Ohio State University with a B.S. degree in chemical engineering and received his master's degree from the University of Akron. He started with Firestone as a chemical engineer in the analytical laboratory in 1944 and was named supervisor in 1953. In his work, Mr. Kress dealt with the development of analytical methods for rubber products and compounding ingredients. During his career with Firestone, he presented several technical papers before the Rubber Division of the American Chemical Society and had eight papers published in technical magazines. Mr. Kress was a member of the American Chemical Society and its Rubber Chemistry and Analytical Division, the Society for Applied Spectroscopy, and the Akron Rubber Group. He is survived by his wife, three daughters and a son.

Robert L. Smith

► Robert L. Smith, supervising manager of the Test Division in the Development Department for the Firestone Tire & Rubber Co., died on June 14 at the Akron General Hospital after a long illness. He was 50 years old. A native of Toledo, Ohio, and a graduate of the Case Institute of Technology, Mr. Smith started in Firestone's Development Department in 1926 and was named manager of the Test Division in 1942. During his 33 years with the firm, he pioneered many tire and testing techniques and designed the seven mile track and other testing facilities at the Firestone Test Center, Fort Stockton, Texas. He also supervised establishment of Firestone's Normoyle Ordnance Tire Test Fleet and Camp Bullis Proving Grounds at San Antonio, Texas. He is survived by his life, six sons and a daughter.

Edward T. O'Grady

► Edward T. O'Grady, manager of the Gum Department of Morningstar-Paisley, Inc., died recently in the Staten Island Hospital, Staten Island, N. Y. He was 41 years old. A veteran of World War II, Mr. O'Grady won the Distinguished Flying Cross as a bombardier with the Eighth Air Force in the European Theatre. He was a past president of the Water Soluble Gum Association of America. He is survived by his wife, two sons and two daughters.

Harry M. Naugle

► Harry M. Naugle, chairman of the board of Worthington Ball Co., Elyria, Ohio, died on July 14 in Canton, Ohio. He was 74 years old. Mr. Naugle was born in 1884 in Ligonier, Penna., and attended the University of Pennsylvania and Drexel Institute of Technology. In 1907 he was chief engineer for the Berger Mfg. Co. of Canton, Ohio, and 10 years later he became first vice-president and general manager of National Press Steel Co. of Massillon, Ohio. In 1921, Mr. Naugle joined the Columbia Steel Co. of Elyria, Ohio, and served as vice-president and general manager. From 1923 to 1933, he was president of the firm of Naugle & Townsend, Inc., Engineers. He was best known in the steel industry for his invention, with the late A. J. Townsend, of the continuous strip rolling process. In 1930, he received the Young Pioneer award for developing the four high rolling mills and built the first mill for that development in 1921-1922. In 1933, he became president of the Rotary Electric Steel Co. in Detroit, Mich., and retired from this position in 1940 and became chairman of the board of directors. In 1934, Mr. Naugle became president and general manager of Worthington Ball Co. in which capacity he served until he became chairman of the board in 1957. He was also a director of the Worthington company continuously from 1927. Mr. Naugle was a member of the Brookside Country Club of Canton, Ohio, and the Union Club of Cleveland, Ohio, and a member emeritus of the American Iron & Steel Institute. He is survived by his wife.

Rupert T. Cooke

► Rupert T. Cooke, former board chairman of Francis Shaw & Co., Ltd., Manchester, England, died in London on June 12. He was 84 years old. Mr. Cooke was a director of Francis Shaw & Co. for 57 years and board chairman for 30 years. He did much in his early days to support the growth of the rubber plantation industry. Mr. Cooke played an important part in the field of engineering for the rubber industry over the past 60 years during its great period of expansion. In later years, he took active part in the affairs of the institutions and trade associations connected with the rubber and hydraulic engineering industries.

Harry Greene

► Harry Greene, a founder and president of the Rubber and Asbestos Corp. of Bloomfield, N. J., died on July 9 of a heart ailment. He was 74 years old. Mr. Greene was president of the concern from 1936 until his retirement in 1950. He attended City College in New York City. Surviving are his wife and a daughter.

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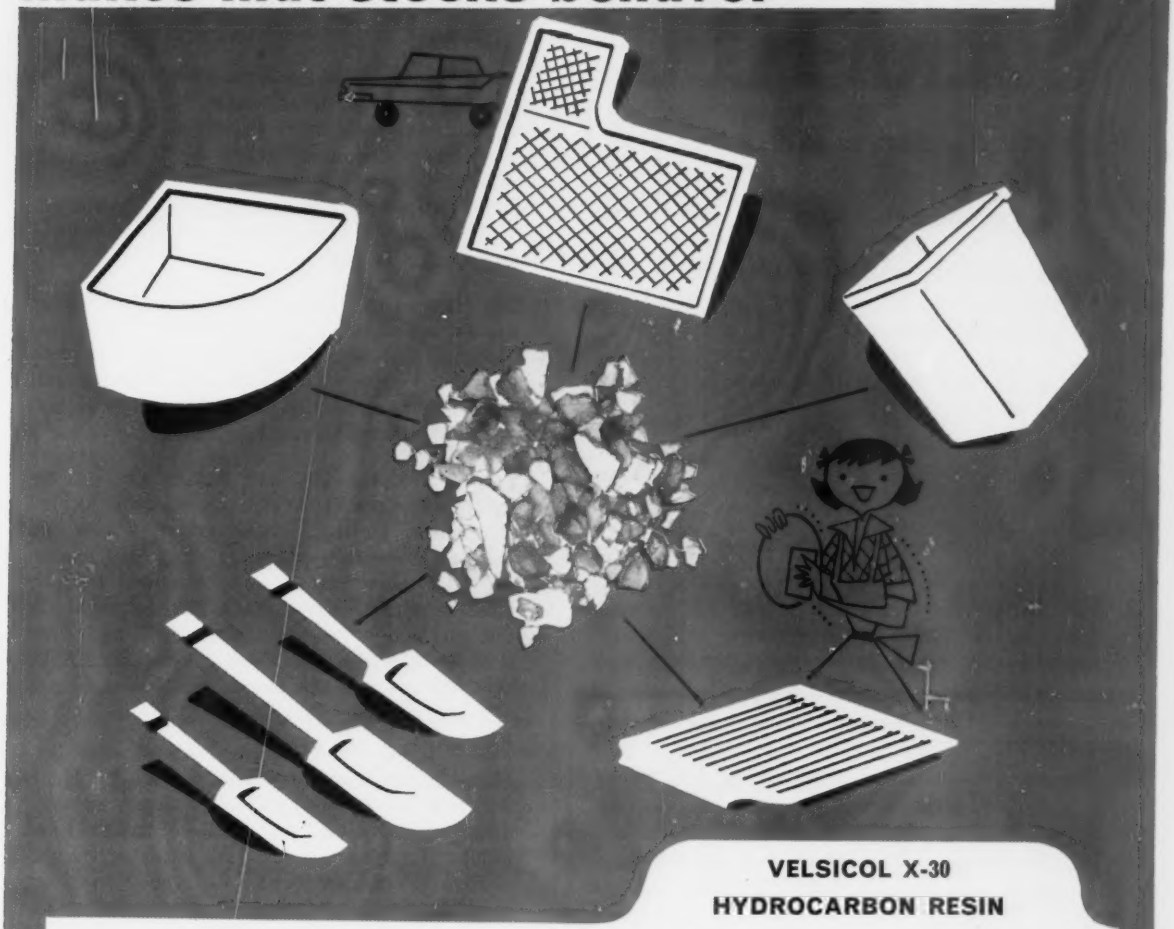

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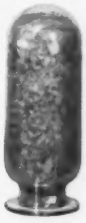

Type: Thermoplastic Hydrocarbon
Form: Flaked
Softening point (ball and ring): 210°—220°F.
Color (coal tar scale): 1½—2
Color (Gardner): 10-11
Color (Rosin scale): I—K
Acid No.: 0-2
Saponification No.: 0-2
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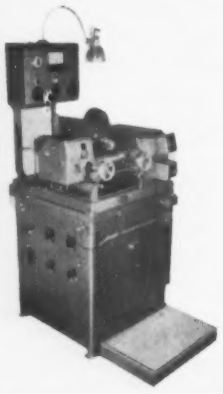

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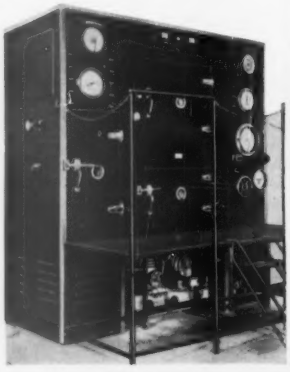

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Overseas

Kuala Lumpur—Dayton Rubber International Co. and two Malayan industrialists have signed an agreement to build a tire factory in Malaya. The project has been submitted to the Malayan government with an application for tax exemptions under the pioneer status ordinance. Construction of the plant will start after the Malayan government issues its approval.

The Hague—B. F. Goodrich Chemical Co. plans to establish a European sales office in The Hague, Holland. The office, which will be the European sales headquarters for plastics materials, special purpose rubber and general chemicals, will also provide technical service information.

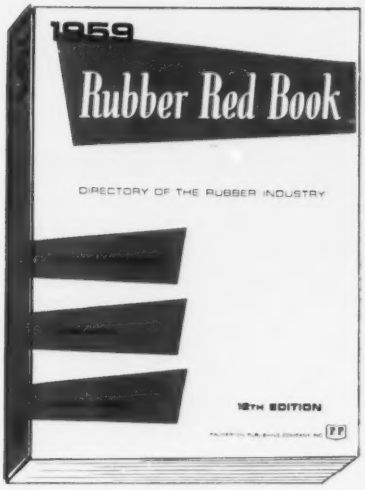
Paris—Goodyear Tire and Rubber Co. has selected a 75 acre site in Amiens, which is located near Paris, for the construction of a new tire and tube manufacturing plant. Expected to cost $7,000,000, the plant will be equipped with the most modern tire manufacturing equipment for the production of passenger, truck and farm tires for replacement and original equipment. The tires will be produced for distribution in France and the European Common Market as well as for export.

Bonn—Afina Gummi-Werke G. m. b. H. is seeking United States patents under a licensing arrangement for the manufacture of technical and industrial rubber articles. The firm, which specializes in the production of rubber footwear, including boots and sneakers, plans to enlarge its program to include the manufacture of other rubber products having good market potential in Germany and other European countries.

Tokyo—Japanese Geon Co. has established a synthetic rubber manufacturing plant in Kawasaki City near Tokyo. The synthetic, suitable for automobile tires, shoe soles and packings, will be manufactured under a technical assistance contract with the B. F. Goodrich Chemical Co.

The Hague—Netherlands-American Tire Co. and Vredestein Rubber Co. plan a merger in order to permit entry into the European Common Market sales competition from a stronger position. Vredestein will offer to exchange its own shares for those of Netherlands-American, which is 21 per cent owned by the B. F. Goodrich Co.

Paris—A butadiene extraction plant that will use cracked gases as raw materials will be constructed just outside of Marseilles by Naphtachimie S. A. of France. Initial capacity of the unit is expected to be 6,000 to 7,000 metric tons annually. A substantial interest in the firm is held by Se Francaise des Petroes BP.



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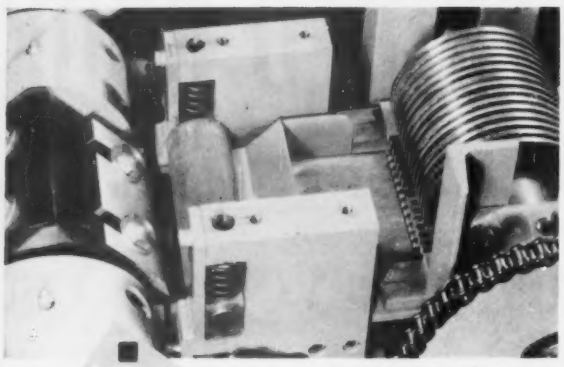

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New Goods

Holiday Foamatic Cushion

► Holiday Line, Inc., New York, N. Y., has introduced an outdoor cushion that inflates itself and can be adjusted for individual comfort. Covered with Velon, the cushion is said to be completely water-proof and can remain out-of-doors in any weather without damage. This cushion, called Foamatic, consists of a combination of

plastic foam and air and can be adjusted to any degree of softness, the company states. A small valve can be opened to introduce air automatically and if less buoyancy is wanted, slight pressure will force the air out and the valve can be closed when the proper softness is reached. For ease of carrying, the air can be completely removed and the cushion rolled up compactly. To re-inflate, no blowing up is necessary; the valve is opened and the cushion reshapes itself automatically. The foamatic cushion is available in colorful metallic tweed patterns of Velon as well as gay prints.

Pawling Dock Bumper

► A new dock bumper for truck loading platforms has been developed by the Pawling Rubber Co., Pawling, N. Y. The company claims that the bumper will absorb the impact of a truck going 20 miles an hour. Designed for savings in dock maintenance, the bumper is made of a new rubber compound formulated especially for this use, and the material is tough, weather resistant and long lasting, the company states. The rubber bumper has an "I" beam design, and its face can be reinforced with steel plate. The bumper is easily installed with lag screws. The standard section is twelve inches long, but is also available in multiples of six inches up to six feet in length, the company states.

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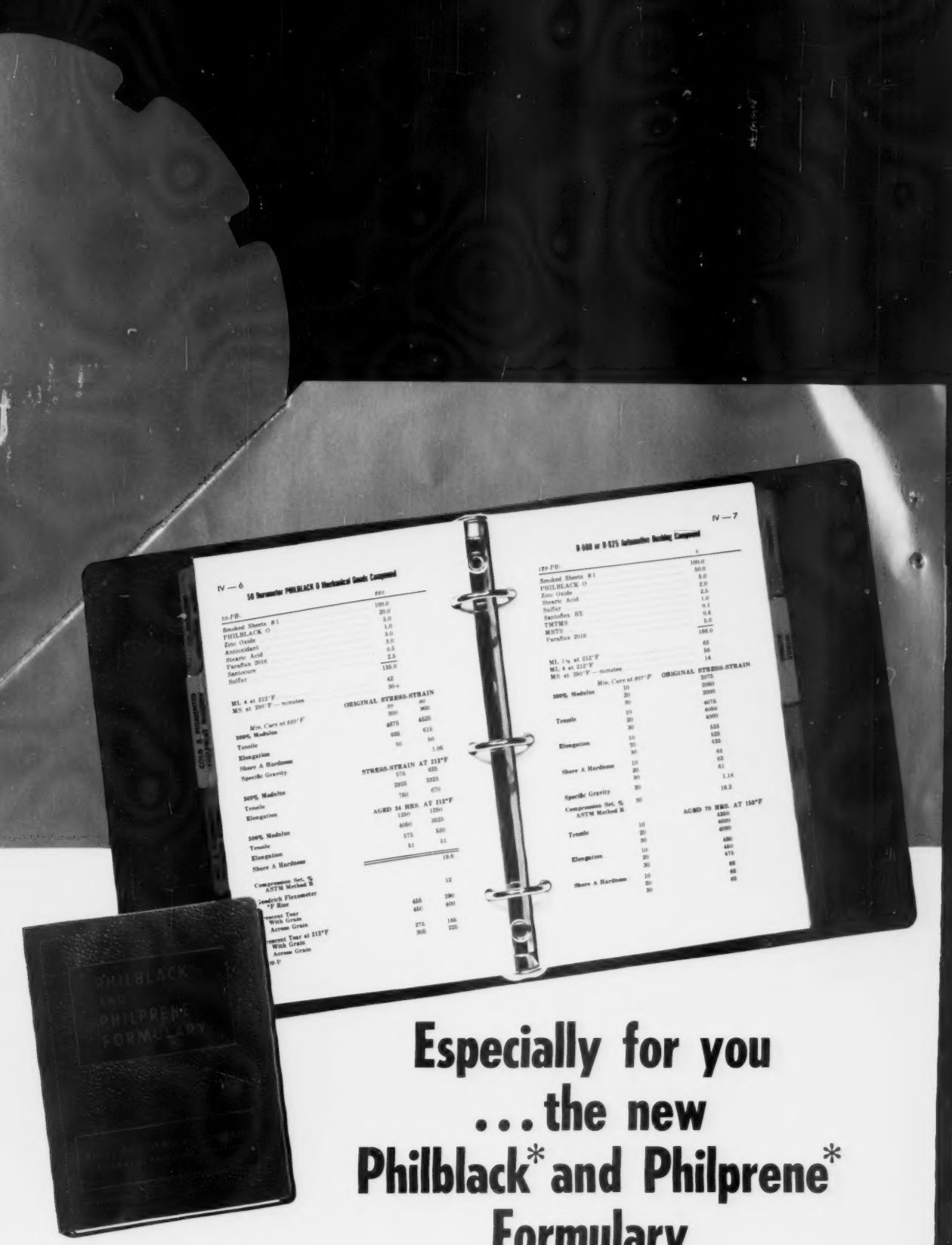

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Phillips Chemical Company has compiled a comprehensive ... *and invaluable* ... handbook for rubber compounders and manufacturers of various rubber products.

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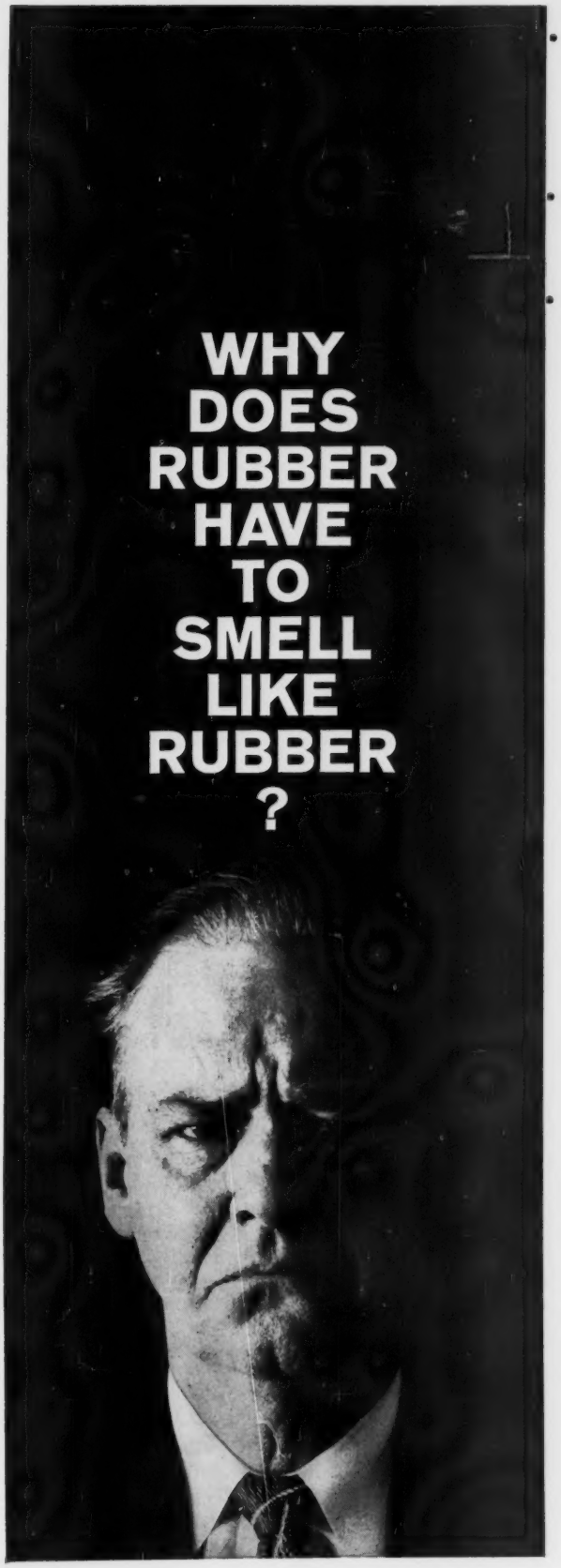

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Facepiece For Masks

► A new facepiece for gas masks, hose masks, air line respirators, and demand breathing apparatus has been developed by Mine Safety Appliances Co., Pittsburgh, Penna. Called the M-S-A Clearvue, the new facepiece features a large single lens, which is readily replaceable. The facepiece is designed to eliminate fogging of the lens, and has an improved speaking diaphragm, and built-in accommodation for prescription glasses. The

company reports that the facepiece will be incorporated in virtually the entire line of M-S-A masks, air line respirators and demand breathing apparatus. The wrap-around lens assembly can be replaced quickly in the field. Formed wire fasteners can be removed and re-used for installation of a new lens. Uniform tension of the fasteners maintains the seal around the lens periphery, and prevents loosening or shifting. Inspired air is directed over the lens surface by a ducting arrangement, and moist air is diverted by means of a system of baffles to prevent lens fogging. The Clearvue facepiece has also been designed to provide full accommodation for prescription glasses. An optional kit is available for precise fitting of prescription glasses with normal lens size. Exact positioning of temples within the facepiece maintains seal and prevents possible leakage. A new type of speaking diaphragm is featured with the facepiece. For compactness, the exhalation valve is integrated with the housing of the diaphragm, and the diaphragm, made of Mylar, can be easily replaced.

White Vinyl Volleyball

► A white vinyl volleyball made by Barr Rubber Products Co., Sandusky, Ohio, is being marketed as part of a Junior Volleyball Set, which includes a 10 foot net, playing instructions and valve for reinflating the ball. According to the company, the ball is easy to clean, scuff-proof and waterproof.

NEW EASY PROCESSING RUBBER

Ameripol 4600 permits short breakdown time; fast cure

Ameripol 4600 is a new non-staining cold SBR polymer designed for easy processing into shoe soles, floor tile and other light colored or white products.

It has a Mooney viscosity in the 36 to 48 range. Thus the polymer can be broken down in drastically reduced time compared to high Mooney polymers generally used. Ameripol 4600 has good physical and aging properties. Being a fatty acid type polymer, it cures quickly.

This polymer is now available in production quantities. Why not give it a test? We'll gladly send complete data and samples for your evaluation . . . use the coupon for your convenience. Goodrich-Gulf Chemicals, Inc., 3121 Euclid Avenue, Cleveland 15, Ohio.

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☐ Please send technical data sheet on Ameripol 4600.
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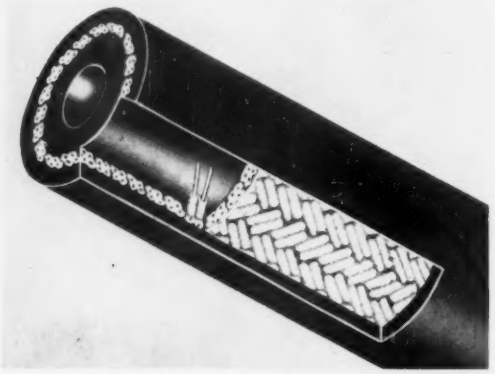
Burst Resistant Hose

► A burst resistant hose for use on steam pressing iron in clothing manufacturing plants is available from Raybestos-Manhattan, Inc., Passaic, N. J. Extremely flexible and light in weight, the hose, called Homoflex, is designed for a wide margin of safety and operator protection. According to the company, Homoflex pressing iron hose features a tube with high resistance to heat and charring, while its butyl cover withstands heat and oxidation and remains flexible despite long usage. The strength member, composed of long fiber asbestos, is tightly twisted around a high tensile corrosion resistant wire to make the hose burst resisting. The wire prevents an open burst when the hose is worn out. Homoflex comes in sizes 3/16 to 3/8 inches, and is recommended by the company for use up to 100 pounds steam pressure.



U.S. Rubber Conveyor Belting

► The U.S. Rubber Co., 1230 Avenue of the Americas, New York 20, N. Y., has introduced a friction surface conveyor belting which is reported to give long life. The new type of belting, called U.S. Indestructible Slab, is designed to operate more efficiently and for a longer period on jobs where other friction surface, woven duck or stitched canvas belting is currently being used, the company states. The company reports that the use of the highest grade rubber frictions makes the belt harder to tear up or wear out. Extra thick skim coats of natural rubber check wicking and block edge ravel. Available in three or four ply constructions, the belting is bright orange in color. It has a non-staining surface that also is resistant to mild acids such as those in citrus fruits. Because of its supple natural rubber construction, the belting can easily flex around the small pulleys which are standard on package conveyors. The belt comes in 14 stock widths, ranging from 4 to 48 inches, and regularly comes in 250 and 500 foot rolls, though shorter lengths are furnished as desired.

Poly-D Industrial Glove

► The Wilson Rubber Co., Canton, Ohio, has added Wil-Gard Poly-D (polyethylene disposable) gloves to its line. The clear polyethylene, five-fingered disposable gloves offer convenient hand protection and can be worn on either hand. Lightweight, flexible and moisture proof, Poly-D gloves protect hands from scores of chemicals,

powders, and resins, the company states. They also safeguard precision parts against perspiration, corrosion and keep foods free from hand contamination. The gloves feature strong, heat-welded seams with supersmooth edges that provide excellent resistance to snagging and tearing without sacrificing manual dexterity and touch sensitivity, the company reports. Available in medium and heavy weights, Poly-D gloves come in small, medium and large sizes.

Inflatable Sports Vest

► A new sports vest for sailors, water sports enthusiasts and hunters has the appearance and comfort of a sleeveless sweater, yet provides the same type of flotation system used by the U.S. military forces. Developed by Rubber Fabricators, Inc., Grantsville, West Va., this instantaneous inflation system floats the wearer in an upright, face-up position, even if unconscious. Beneath its exterior, the vest has concealed an automatic inflation system that will float any person instantly by pulling two red tabs. Compressed gas jets into the front flotation compartment and the neck cushion, when the tabs are pulled, and a supplementary oral inflation system permits the wearer to inflate or deflate as desired. Compressed carbon dioxide gas is contained in shatterproof metal cylinders. Available in men's and women's models in sizes ranging from extra small to extra large, the vests are ideal for all over water sports activities, the company states. A special model is available for fishermen and hunters, with special pockets and a lambs wool patch for hooks and flys.

You rave so much about how MAGLITE solved your scorch problems with neoprene, how was I to know that it wouldn't do the same for my cooking?

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Want to eliminate scorch damage in neoprene processing? Specify MAGLITE D. Tests prove that it offers better scorch protection for neoprene than any other magnesium oxide you can use. MAGLITE D also helps solve storage problems since it occupies about one-third the warehouse space as many of the lightweight magnesias. The benefits of using MAGLITE K, M, or Y for other elastomers and certain product or process requirements are equally impressive. For samples and technical information write to MERCK & CO., INC., Marine Magnesium Division, Department RA-5, Rahway, New Jersey.

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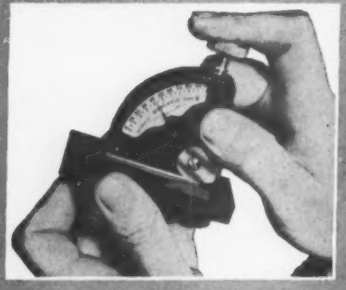

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The Shore Durometer is available in various models for testing the entire range of rubber hardness and is furnished complete with standard spring block and carrying case.

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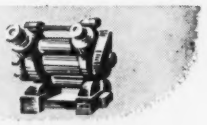
Manufacturers of the "Scleroscope," for testing the hardness of metals.

New Equipment



High Temperature Platen Press

► Pasadena Hydraulics, Inc., 1433 Lidcombe, El Monte, Calif., produces a line of hydraulic presses capable of a sustained platen temperature of up to 1500°F. These presses, for production

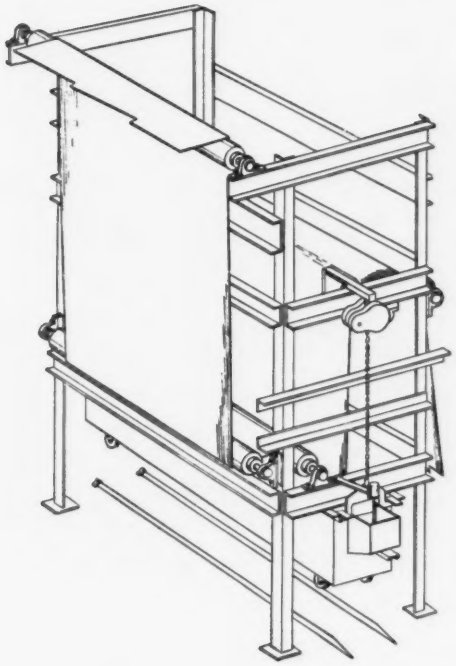
molding or research and development use, feature electrically heated platens which are individually temperature controlled and the temperatures accurately recorded. The platens are said to be so effectively insulated that the press frame is not heated nor is the surrounding area a "hot oven" condition. A motorized hydraulic system including variable closing and pressing speeds and large pressure gages permits accurate reading in low, intermediate and high ranges. Platen sizes range from 8 to 24 inches square, and the tonnage from 40,000 to 1,000,000 pounds for ram force.

OPW-Jordan Pressure Reducing Valves

► Now available from OPW-Jordan, 6013 Wiehe Road, Cincinnati 13, Ohio, are 4 and 6-inch pilot operated pressure reducing valves with patented sliding gate and plate seats. Line pressure operated regulators are said to give tight shut off, accurate control and to minimize maintenance. The valves are capable of handling 50,000 pounds of steam per hour or 2300 gallons of water per minute. They are suitable for pressures to 125 psi wsp and temperatures to 406°F.

TIRE FABRIC PROCESSING EQUIPMENT

LATEX DIP UNITS



SINGLE OR MULTIPLE IMMERSION ROLLS – 200# TO 3000# TENSION
ENCLOSED BEARINGS OR PIVOT POINT SUSPENSION

SQUEEZE IN DIP, WITH HELPER DRIVE IF DESIRED

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MINIMUM OF SPLASHING - CLEANER SURROUNDING AREA

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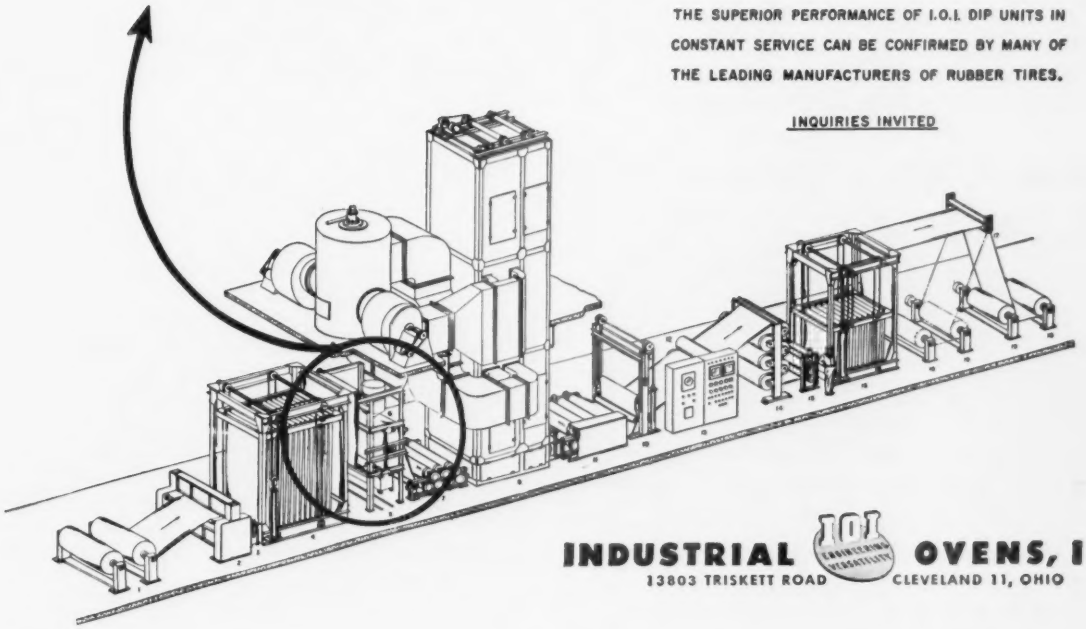
THE SUPERIOR PERFORMANCE OF I.O.I. DIP UNITS IN CONSTANT SERVICE CAN BE CONFIRMED BY MANY OF THE LEADING MANUFACTURERS OF RUBBER TIRES.

INQUIRIES INVITED



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finely divided wood cellulose

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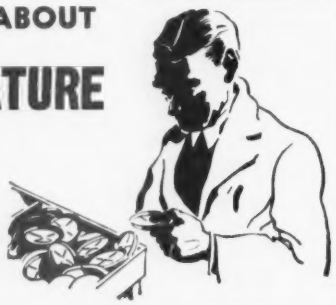
TEMPERATURE



REJECTS ARE A TOTAL LOSS!

There is very little you can do with scorched rubber except charge it off to experience. Even with the rapid modern accelerators, scorching is avoidable. With the Cambridge Surface Pyrometer, the operator can check, thus control the surface temperature of mill, warming and calender rolls. It is an accurate, rugged, quick-acting instrument, so easy to use that operators are glad to use it.

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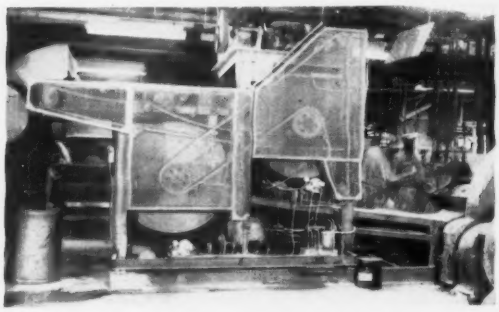
PYROMETERS

THEY HELP SAVE MONEY AND MAKE BETTER RUBBER

Mottle Cooling Unit

► Mayer Refrigeration Engineers, Inc., Lincoln Park, N. J., has announced a new asphalt, rubber or vinyl tile mottle cooling unit designed for maximum cooling with minimum floor space requirement. The unit is designed to cool 10,000 pounds



of mottle per hour with an input temperature of 250°F. and an outlet temperature of 75°F. The machine employs Mayer "spray-blast" rolls. The conveyor is regulated with a variable speed drive that synchronizes automatically with the operating speed of the mill or calender. The unit also has an automatic edge position control that maintains a uniform position of cooling roll belts. Operating speed is up to 40 feet per minute. The cooling water temperature is regulated at 40 to 45°F. Dimensions of the unit are: length, 107 inches; width, 64 inches; and height, 95 inches.

Micro-Hardness Testers

► The Model H-5 Wallace dead load microhardness tester for rubber, rubberlike materials and plastics, manufactured by Testing Machines, Inc., 72 Jericho Turnpike, Mineola, Long Island, N. Y., eliminates the need to mold standard size test specimens and permits the hardness of small parts, sheets, and irregular shapes to be measured directly. The depth of indentation is measured electronically. The basic machine consists of an indentor and a means of applying a minor and then a major load. For O-rings, small pieces or seals, and irregularly shaped parts, it provides a test not obtainable by other methods. The tester is said to give accurate readings on specimens less than ½ mm. (.01969-inch). This feature is vital where only a very thin layer may be available for test. The unit can also measure the hardness or softness of insulating materials on electric wire without stripping the wire or molding a specimen. By taking a series of readings at convenient time intervals it is possible to plot a graph relating indentation and recovery time. Other models of the tester measure the hardness of rigid plastics and the state of cure of synthetic resin and fiber reinforced materials, and of extremely thin surface coatings.

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NEW Hopper Loader

Ideal for small parts, moldings, etc., the GOODMAN Vibratory Feed INSPECTION TABLE pays for itself in a few months! Inspection is much faster, yet requires fewer operators. Work flow is smoother, quality control improved, inspector fatigue reduced. An efficient addition to every inspection department.

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- "Two girls are now doing the work of eight."
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A constant volume of air at a controlled temperature in the heavily insulated cabinet, maintains uniform predetermined specimen temperatures regardless of variations in room conditions.

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All automatic controls are located on the front panel of the Weather-Ometer directly above the door of the test chamber.

Both horizontal and vertical testing is available. Shallow containers are used for semi-liquid materials and vertical panels for solid materials.

Source of radiation is two Atlas enclosed violet carbon arcs.

Complete technical information on the DMC Model and other Weather-Ometers is contained in the new Weather-Ometer catalog. Copy on request.

FADE-OMETER ®

The Atlas Fade-Ometer has world-wide acceptance as the standard machine for testing the action of sunlight on materials.

A wide range of industrial products are tested daily in Atlas Fade-Ometers to determine the deterioration of materials due to the action of sunlight.

From 21 to 126 samples, depending on size, can be simultaneously exposed to the light of the Atlas Enclosed Carbon Arc. Temperature is controlled automatically and humidity is furnished by evaporation from a constant water reservoir. Operation of the Fade-Ometer is completely automatic, permitting the machine to be left in continuous 24-hour operation.

The Carbon Arc Lamp in the Fade-Ometer produces radiation at the sample similar to sunlight, both as to intensity and spectral distribution.

If your product is subject to deterioration by sunlight our engineers, with over a quarter of a century of experience in predetermining the fading of materials, can help you. *Catalog with technical information on request.*

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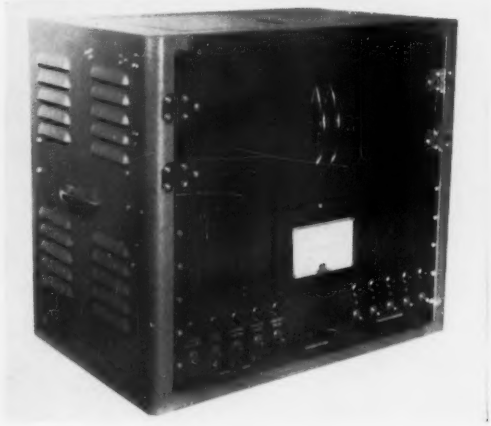
Manufacturers of accelerated testing equipment for over a quarter of a century.

Automatic Ozone Control System

► The new OREC 0300-3 automatic ozone control system, an electronic-chemical loop feed back servo system for the continuous control of ozone concentrations in any confined space, is produced by Ozone Research and Equipment Corp., 3840 North 40th Avenue, Phoenix, Arizona. The system features an input ozone concentration meter for selecting the ozone concentration which the unit is to maintain. The system is applicable to industrial processes, laboratory processes, manually controlled ozone test chambers, and environmental (altitude, humidity, temperature) chambers to which it is desired to add controlled ozone concentrations. The standard unit is a bench model 23-inches wide, 19½-inches high, and 15-inches deep. Accuracy is said to be 4% of operating scale. Multiple ozone concentrations range from as low as 0 to 25 pphm/volume up to in excess of 0 to 10% of volume. The principle of operation is the electronic-chemical loop feedback servo system. Sensitivity is said to be less than 1 pphm/volume. Weight of the instrument is 115 pounds.

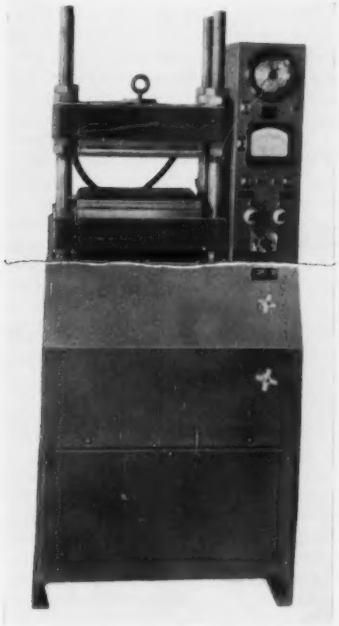


Chemical Proportioning Pump

► A new plunger-type, small capacity proportioning pump designed for the accurate and efficient chemical treating of small, low pressure boilers is manufactured by Proportioneers Division, B-I-F Industries, Inc., 345 Harris Ave., Providence 1, R. I. Tradenamed Model 1107 Adjust-O-Feeder, the pump provides low-cost injection of boiler treatment chemicals in boilers, and is said to be ideal for treating make-up water or for constant feeding at low rate. In addition, it is suitable for the correct proportioning of chemicals in industrial processes. Design features include adjustable stroke length to give feed rates of from 0.2 to 2 gph into 300 pounds maximum discharge pressure.

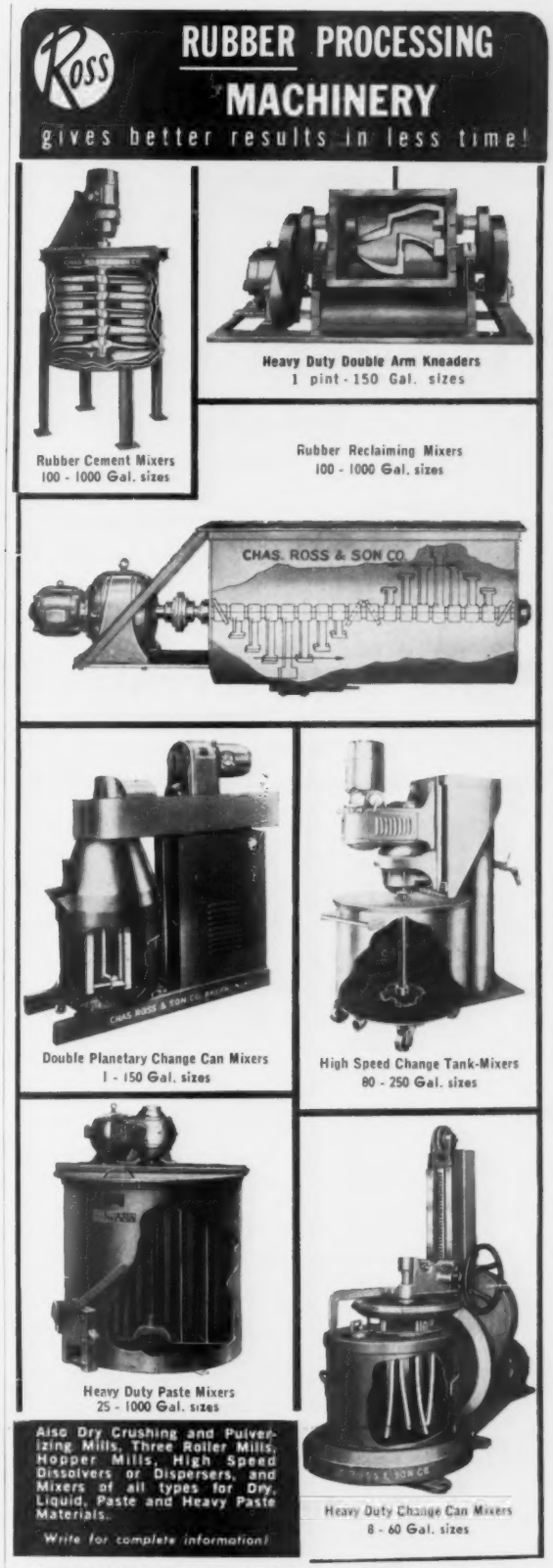
Hydraulic Laboratory Press

► A new 50-ton hydraulic laboratory press introduced by Wabash Metal Products Co., Wabash, Ind., features greater convenience of working height than conventional presses. Electrically heated flat ground platens, 12 x 15 inches, can be furnished drilled for steam or for water cooling. Platens have precision-bored guide holes to insure uniform raising and lowering on the four 1¾-inch diameter hard chrome plated columns and for accurate seating. Features of the press include: sensitive gage for indicating pressure exerted; hydraulic system with safe overload capacity; pyrometer connected to platens by means of thermocouples. The temperature of either platen can be read independently by flicking a switch. A red signal light shows when the thermostat is functioning.



Trent Basic Oven

► A new basic oven, designated COF, is used for controlling heating processes up to 650°F. Designed to meet the demand for "custom-made" heating without the expense of extra equipment which may be unproductive for the small shop, the oven, which is manufactured by Trent, Inc., 211 Leverington Ave., Philadelphia 27, Penna., features a 3-inch glass wool insulation, steel inner and outer casing, forced air recirculation with horizontal flow front to back, a single hinged door, shelf supports and one removable shelf. Optional features are also available. An alternate design, designated COFH, is a basic oven for processes up to 1200°F.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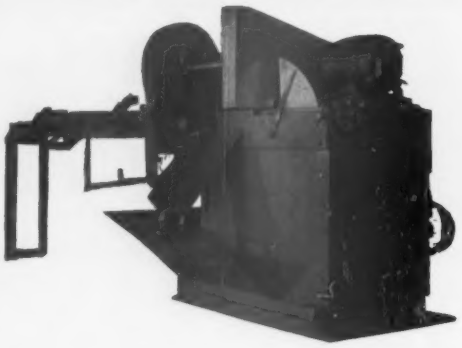

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Reviews

Symposium on the Literature of Rubber. Published by the Division of Rubber Chemistry, American Chemical Society. (Copies are available from the Treasurer of the Division, G. E. Popp, Phillips Chemical Co., Akron, Ohio.) 8½ x 11 in. Approximately 135 pp. $2.50

This paperbound book contains addresses presented at a symposium on "The Literature of Rubber" held jointly by the Division of Rubber Chemistry and Division of Chemical Literature of the American Chemical Society in 1956 at Atlantic City, N. J. (Two papers are presented only in abstract form.) The work is of extraordinarily high quality, and the total presentation of great value for its survey of the field of rubber literature. The first seven papers deal with basic sources of information —books, periodicals, indexes and abstract publications— and the remaining six with special forms of publications and how rubber literature is created and disseminated. The authors are for the most part well-known in the rubber industry and need no introduction to the initiate. They and their subjects are:

S. G. Byam, "The Jargon of the Rubber Industry;" T. H. Messenger, "The Literature of Natural Rubber;" Leora Straka, "The Literature on Synthetic Rubber;" Dorothy Hamlen, "The Rubber Division Library—An Experiment in Cooperation;" Lois W. Brock, "Classification Schemes for the Literature of Rubber;" H. A. Winkelmann and J. M. Ball, "Reclaimed Rubber—A Guided Tour Through the Literature;" Kathleen S. Rostler, "Rubber Compounding Information: Sources, Searching, Recording and Retrieval."

And T. A. O'Brien, "Patent Searching in the Field of Rubber Technology;" J. J. Allen, "Standards and Specifications for Rubber and Rubber Products;" P. S. Greer and J. Kanegis, "Government Reports on Rubber;" H. N. Stevens, "Sources of Market Information on Rubber, Rubber Raw Materials and Rubber Products;" R. G. Seaman, N. Bekkedahl and David Craig, "New Publication Plans of the Division of Rubber Chemistry," and M. E. Lerner, "How Rubber Literature Is Created: Preparing the Technical Paper."

Chairman of the Symposium was Hanna Friedenstein, whose introductory remarks are also incorporated into the book.

The Division is to be commended for its efforts in having this book prepared. The survey of information on rubber literature which it contains will for a long while be a basic reference source to those who are new to the industry, or who must investigate branches of the literature with which they do not customarily deal. Of special value are the extensive bibliographies included in many of the papers. The presentation is clear and legible, both in content and form.

•

Processing of Thermoplastic Materials. Edited by Ernest C. Bernhardt. Published by Reinhold Publishing Corp., 430 Park Ave., New York 22, N. Y. 6 x 9¼ in. 690 pp. $18.00.

The technical problems encountered in extrusion, injection molding, calendering and other thermoplastics processing operations are closely interrelated. The purpose of this volume is to emphasize the scientific foundation which underlies an engineering approach to the processing of thermoplastic materials, and to direct attention to areas where further engineering studies are needed.

A roster of twenty specialists from the industrial and

academic worlds has been recruited to write the individual chapters which together comprise a survey of the field. A listing of chapters gives an idea of the scope. In Section I, on "Fundamentals," there are chapters on "Flow Behavior of Thermoplastics," "Heat Transfer and Thermodynamics," and "Mixing and Dispersing."

In the second section, which deals with applications, there are seven chapters: "Extrusion," "Injection Molding," "Calendering," "Mixing and Dispersing Processes," "Sheet Forming," "Forming of Hollow Articles," and "Sealing and Welding of Thermoplastics." The last section has a chapter on "Processing Properties."

Polymer processing has today developed to the point that it is an involved proposition. The cost of carrying out experimental development work on large-scale operations is so high that a more certain and scientific approach to the design of equipment is required. The present volume has been assembled to aid the engineer in his goal of calculating and predicting the performances of polymer processing equipment, working from the design and operating variables and from the physical and chemical properties of the material being handled.

The book is well edited and contains valuable information. It is a welcome addition to the bookshelf.

Linear Polyethylene and Polypropylene: Problems and Opportunities. By James M. Beck, Richard B. Black, George L. Dienes, Clinton O. Johnston, Richard J. Kirk, Samuel A. Martin, John T. Pierson, Jr., Donald R. Riehl and Richard D. Schneider. Published by Polymer Associates, 6613 Wenonga Road, Kansas City, Missour. 8¼ x 1 1in. 168 pp. $13.50.

A comprehensive report on the rapidly expanding field of high-density plastic polymers is provided by this publication. The following are offered in concises and readable language: (1) A discussion of basic chemistry in layman's terms and significance of the technical breakthrough that had made production of these polymers possible; (2) Comparisons of properties with those of other plastics, with analyses of the advantages and disadvantages of these properties in specific applications; (3) An up-to-date compilation of the present position, current problems and future plans of resin manufacturers in the United States and abroad; (4) Case histories of fabricators' experiences with high-density polyethylene and polypropylene, and an analysis of their problems and opportunities with these materials; (5) A chapter on manufacturer-fabricator relationships; (6) An appraisal of the future trends and uses of these new materials, and their impact on conventional plastics and other materials, and (7) A glossary of technical and fabrication terms pertaining to linear plastics.

This book is the result of an assignment given the authors while attending the Graduate School of Business Administration of Harvard University. They found that information on linear polyethylene and polypropylene was so scattered and technical as to impede sound business evaluation of their impact and future. The purpose of this report is to remedy this situation. The sources used by the authors were interviews with persons in the plastics industry; books, articles and industrial literature; and correspondence and mail surveys.

One point of interest produced by the survey is the implication that industry may find it advantageous to shift capital resource from planned linear polyethylene expansion into polypropylene due to an overcapacity problem in the production of the former. The authors add however that linear polyethylene is so new that many volume applications have yet to feel its full impact.

The approach of this effort is concise but scholarly. The authors support their conclusions both by research and sound reasoning. Industrial personnel in the plastics and related industries will find much of value here.

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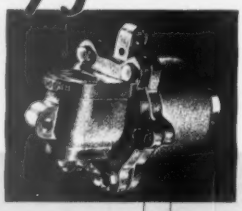

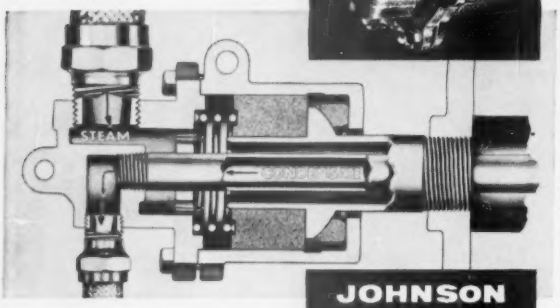

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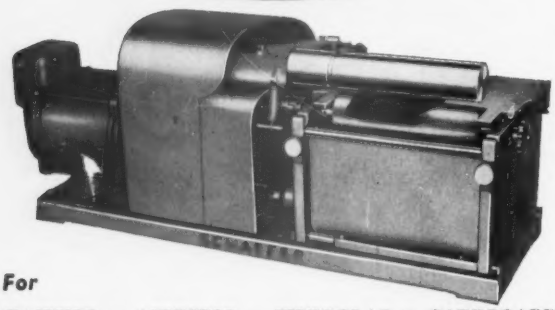

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BOOKLETS, CATALOGS, etc.

Low-Water-Absorption Neoprene Compounds. By H. H. Klever. (Bulletin BL-353). Elastomer Chemicals Dept., E. I. du Pont de Nemours & Co., Inc., Wilmington 98, Del. 6¼ x 9½ in. 8 pp.

This technical bulletin reports a study made of neoprene compounds with low water absorption characteristics. Such lead-free neoprene compounds having very low water absorption can be made using finely divided silica fillers. Even lower water absorption values are obtained when diethylene glycol and silica fillers are used in combination. Tables present recipes for both black and light-colored stocks, with complete data on physical properties before immersion and volume increase after immersion for various lengths of time. Physical property changes after immersion for 90 days are also given. Effect of silica loading on water swell is portrayed graphically.

•

Flexzone 3-C. By F. B. Smith. (Compounding Research Report No. 43). Naugatuck Chemical Division, United States Rubber Co., Naugatuck, Conn. 8½ x 11 in. 16 pp.

A new chemical (N-isopropyl-N'-phenyl-p-phenylene diamine), developed as a protective agent for natural and synthetic rubber against flexing, ozone, heat and oxygen, is described in this technical bulletin. Sections present data on a description of the material; recommended amounts to use and compounding properties; blooming limits and discoloration; use in truck tread applications; compounding truck treads for improved cracking resistance; use in passenger tires; test methods, and physical properties. Numerous recipes with test properties of the vulcanizates are included.

•

Disowheel "Standards" for General Industrial Applications. Disogrin Industries, Inc., 510 South Fulton Ave., Mount Vernon, N. Y. 8½ x 11 in. 4 pp.

This brochure presents data on Disowheel Standard wheels, a new polyurethane-tired wheel designed for general industrial applications. The folder describes the wheel's features, including superior load-carrying capacity, resilience, abrasion resistance and tensile strength. Possible applications and the benefits which can be derived from use of the wheel are also outlined. A specification list includes the sizes available (ranging from 4 to 28 inches), their respective load capacities, weight and catalog numbers.

•

A Complete Line of High Voltage Control. Cutler-Hammer, Inc., Milwaukee, Wisc. 8½ x 5½ in. 16 pp.

This little bulletin describes the complete line of high voltage control offered by Cutler-Hammer. The booklet discusses the general features of the line, as well as the individual characteristics of both the full and reduced voltage types of high voltage control for squirrel cage, synchronous and wound rotor motors. Ratings, dimensions, bulletin numbers and optional features are included in the presentation.

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The Effect of Lower Zinc Oxide Level on Physical Properties of Hycar Compounds. (Technical Newsletter Vol. 3, No. 1). B. F. Goodrich Chemical Co., 3135 Euclid Ave., Cleveland 15, Ohio. 8½ x 11 in. 8 pp.

This bulletin reports a study done to show the effect of varying amounts of zinc oxide in both hot- and cold-polymerized Hycar rubbers. Three cure systems were evaluated: sulfur with tetramethylthiuram monosulfide, sulfur with benzothiazyl disulfide, and tetramethylthiuram disulfide. Complete recipes and extensive data on the properties of the vulcanizates are presented. Also included are sections on ozone resistance, improving the impact resistance of polystyrene, and compounding for high temperature applications.

•

Custom Work, Service Engineering, Instruments and Equipment for Research, Control and Production. (Catalog No. 59-A). Custom Scientific Instruments, Inc., Kearny, N. J. 8½ x 11 in. 16 pp.

This bulletin contains illustrations and brief descriptions of 73 testers or devices manufactured as standard products. The units are grouped under the headings of abrasion testers; biological and scientific equipment; flammability—ignition testers; production control and research equipment; thermal conductivity—dielectric units; and thickness, compression and recovery gages. Many of them find application in the testing of rubber. The ability of the company to custom build testers of all types is stressed.

•

Century Electric Motor Application Guide. (Form 270-A). Century Electric Co., Eighteenth and Pine Streets, St. Louis 3, Mo. 8½ x 11 in. 16 pp.

This guide, an annual publication, has been expanded in the current edition to include additional information about Century motors and motor applications. Nine major factors in motor selection are described in detail —horsepower, speed, frame size, coupled or belted, voltage, mounting, enclosures, bearings and motor control. Polyphase, single phase and direct current motor selection charts are included. These charts describe typical motor driven equipment, show starting and running torques, and detail load characteristics and type of motor to use. A well prepared and thorough publication.

•

Horizontal Mixers. (Bulletin F-1058). Young Machinery Co., Inc., Muncy, Penna. 8½ x 11 in. 12 pp.

Complete specifications for a line of horizontal mixers ranging up to 500 cubic feet working capacity are given in this booklet. Schematic diagrams are used to illustrate various arrangements of ends, supports, agitators, shafts, glands, covers, inlets and discharges, gates and drives. Data on dimensions, horsepower and other pertinent subjects are presented in tabular form. Four pages are devoted to photographs of machines and installations. Explanatory text supplements the diagrams and tabular information.

•

Poly-V Drive "J". Manhattan Rubber Division, Raybestos-Manhattan, Inc., Passaic, N. J. 8½ x 11 in. 4 pp.

Data on a new drive belt for small machinery, designated Poly-V "J", are presented in this publication. The belt is for use over small sheaves of ¾-inch diameter and up. Schematics of cross-sectional views of the belt and photographs of the belt installed on machines are shown. Design and operating advantages are detailed. The last page of the bulletin gives information on pitch lengths, sheave sizes, horsepower and belt size, and similar subjects.

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MARKET REPORTS

TRENDS
NEWS
PRICES

Natural Rubber

Since our last report (August 3), the price of natural rubber of the New York Commodity Exchange moved in a range of 375 points, high for the period being 40.50c, reached on August 24, and low being 36.75c reached on August 5. The average price of spot rubber for the month of August was 38.43c based on 21 trading days. This compares with an average of 35.19c in the previous month.

As noted elsewhere in this issue, it has been reported that the government is preparing to sell about $30 million worth of natural rubber from the stockpile. Actual disposal sales will not begin until early next year under plans now being drawn up by several executive agencies.

More Sales Possible

There is also said to be a possibility that in fiscal 1961 even more rubber will be sold from the stockpile. These moves will be necessary if Congress, as expected, approves a bill which in effect denies funds to replace rotation stocks. The bill also gives the Administration specific authority to sell perishable materials from the stockpile without replacing them.

The law requires that any disposal of rubber must never disrupt regular markets. In addition, Congress must be notified six months in advance of a sale. Under these conditions, the actual sale of rubber could not begin until next spring.

Reports from London state that the rubber market there is of the opinion that the news from Washington should help to clarify what was a very obscure position. The announcement should serve to allay much of the recent concern about the effect of disposal on natural rubber prices.

Natural rubber's position is still said to be extremely sound. There is still rubber in the British government stockpile. One effect of recent high prices has been an increase in production. Production from Malayan smallholdings, for example, was up 10 per cent in July.

World Requirements

World requirements over the next year should be large enough to absorb any additional supplies without much trouble. At the moment, production cannot keep pace with consumption.

Incidentally, some Malayan producers have voiced concern over the projected U. S. stockpile move. The president of the Malayan Estate Owners Association stated that he has asked the Malayan government to make representations to the U. S. about it. America, he said, agreed not to rotate the stockpile in such a way as to lower the Malayan market.

NEW YORK, SEPTEMBER 1, 1959

Price Data

Closing Rubber Prices on New York Commodity Exchange

FROM AUGUST 1 TO AUGUST 31

Aug.	Spot	Sept.	Nov.	Jan.	Sales
1	....	....	....	....	...
2	....	....	....	....	...
3	37.13	37.15	36.35	35.60	64
4	37.25	37.15	36.30	35.50	51
5	36.75	36.70	35.90	35.00	46
6	37.25	37.20	36.20	35.50	36
7	37.50	38.00	36.30	35.65	64
8	....	....	....	....	...
9	....	....	....	....	...
10	37.50	37.50	35.80	35.05	30
11	37.00	37.00	35.70	34.95	63
12	36.88	36.80	35.50	34.80	67
13	38.50	38.60	36.60	35.65	124
14	39.00	39.40	37.10	35.95	114
15	....	....	....	....	...
16	....	....	....	....	...
17	38.25	39.10	36.60	35.50	103
18	39.50	39.90	37.50	36.20	94
19	40.00	40.50	37.45	36.20	80
20	40.25	41.00	38.00	36.55	133
21	40.00	40.60	37.85	36.15	75
22	....	....	....	....	...
23	....	....	....	....	...
24	40.50	40.15	37.88	36.30	69
25	39.50	39.60	37.15	35.90	78
26	39.75	39.75	37.75	36.50	27
27	38.50	37.50	36.65	35.75	89
28	38.00	37.25	37.05	35.80	58
29	....	....	....	....	...
30	....	....	....	....	...
31	38.00	36.80	36.55	35.35	62

Outside Market

No. 1 Ribbed Smoked Sheets:	
Spot	.38
Oct.	.37½
Nov.	.36¾
Thin Latex Crepe:	
Spot	.40¾
Thin Brown Crepe, No. 2	.38
Flat Bark Crepe	.34

London Market
(Standard Smoked Sheets)

Nov.	35.50 — 35.65
Jan.-Mar.	34.33 — 34.48

Singapore Market
(Standard Smoked Sheets)

Oct.	34.47 — 34.55

Middling Upland Quotations

	July 31	August 31		
	Close	High	Low	Close
Oct.	32.23	32.39	32.32	32.31
Dec.	32.23	32.28	32.23	32.23
Mar.	32.60	32.71	32.65	32.65

Notes & Quotes

A 100 per cent increase in the consumption of plastic foams, from 16,000,000 pounds in 1956 to almost 34,000,000 in 1957 was reported by C. R. Davall, new product market engineer for Union Carbide Plastics Co., before the Annual Conference of the Society of Plastics Engineers. The survey showed that plastic foams now account for about 10 per cent of all cellular materials.

Synthetic Rubber

According to current reports, producers of synthetic and natural rubber are facing stiff competition for European markets. In the United States, consumers now use twice as much synthetic as natural rubber, while in Europe, consumption of the synthetic material amounts to less than half that of natural rubber. It is believed by rubber trade sources that European synthetic rubber use may soon reach a consumption ratio comparable to that in the United States.

Synthetic Consumption

World consumption of synthetic rubber has been increasing during the past ten years, steadily gaining on the use of natural. One of the major reasons for this is the progress synthetic has made in United States markets. Last year, world synthetic rubber consumption increased to 1.5 million tons or three times the 500,000 tons used in 1950.

Several factors contribute to the growing demand for synthetic rubber. In addition to gradually increasing availability, a steady rise in natural rubber prices on world markets are expected to force more European consumers to switch to the synthetic product.

In London, synthetic rubber now sells for about half as much as natural, the price of which has climbed steadily during the past year. Current high prices for natural rubber are believed to be due, to some extent, to the tight supply situation for nearby deliveries and also to considerable Russian buying in recent months.

Encroaches on Natural

In many of its applications, such as in heavy truck tires, natural rubber has long held a dominant position. However, there have been several recent developments in the field of synthetic rubber, which portend that the product will further encroach on natural rubber markets.

In an effort to maintain their lead, natural rubber producers are attempting to fight the inroad of synthetic with new, higher-yielding rubber trees. They hope that this will permit them to market natural rubber at prices which are competitive with those of synthetic.

However, the fruits of any long-range planting program will not be evident for some years to come. Psychologically, the world is beginning to be attuned to synthetic rubber. The question is—when natural rubber is plentiful and inexpensive, will rubber goods manufacturers be ready to resume its major use?

The new synthetic rubber plants now being constructed in Western Europe represent considerable monetary outlay. Cheaper natural rubber three or four years hence may have to overcome many obstacles.

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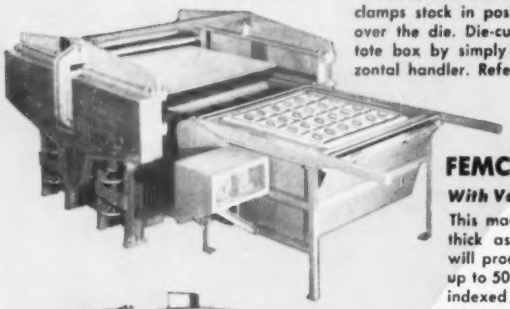
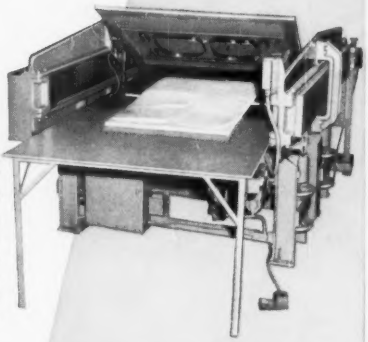
Cycles up to 6 times per minute excluding loading and unloading time and handles sheet stock materials to 50" wide x 45" deep. Vertical Die Handler precompresses and clamps stock in position before roller passes over the die. Die-cut parts are dumped into tote box by simply inverting frame of horizontal handler. Refer to Model 11304.



FEMCO ROLLER DIE CUTTER

With Vertical Die Handling Mechanism

This machine has die cut foam rubber as thick as 4" with true vertical edges. It will process sheets 50" x 45" or roll stock up to 50" wide. The stock can be manually indexed into positions. Machines in operation are cycling as much as 8 times per minute. Model 11401.



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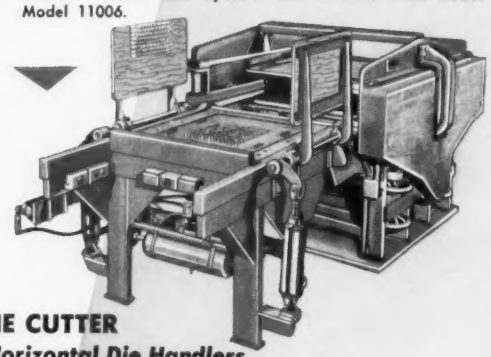

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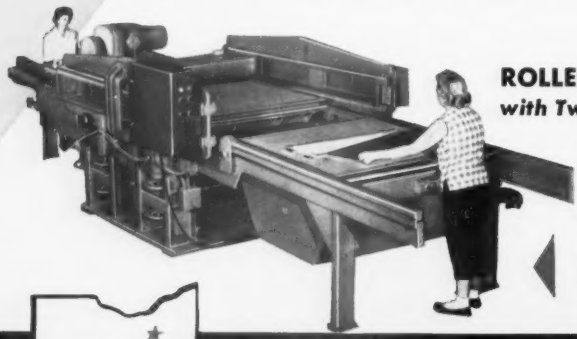

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The FALLS ENGINEERING AND MACHINE CO.

CUYAHOGA FALLS, O.

MATERIALS CUT ON THESE MACHINES include Urethane, Foam Rubber, Curled Hair, Closed or Open Cell Sponge Rubber, Vinyl Foam, Tufflex, Fiberglas, Cotton Batting, Rubber Asbestos, Gasket Materials, Steel Impregnated Asbestos, Cork, Uncured Rubber, Molded Rubber Parts, Vacuum Formed Plastics, Glass Fiber Sheets.

MARKETS

(continued)

Reclaimed Rubber

The Rubber Manufacturers Association reports that 175,581 long tons of reclaimed rubber were produced in the United States during the first seven months of the current year, compared with the 140,831 long tons produced in the same period of the previous year.

A total of 169,906 long tons of reclaim were consumed in the United States in the first seven months of 1959, contrasted with the 138,308 consumed in the corresponding period in 1958.

As of July 31, there were 25,700 long tons of reclaimed rubber in stocks on hand. On July 31, 1958 there were 26,442 long tons of reclaim on hand.

(Prices for All Areas Except Calif.)

	per lb.
Premium Grade Whole Tire	.11½
First Line Whole Tire	.11
Second Line Whole Tire	.10½
Third Line Whole Tire	.10¼
Fourth Line Whole Tire	.09¾
Black Carcass	.15¼
No. 1 Light Colored Carcass	.22
No. 1 Peel	.11
Butyl Tube Reclaim	.14
Natural Rubber Black Tube	.16
Natural Rubber Red Tube	.21
Natural Rubber Gray Tube	.21

Scrap Rubber

Activity on the scrap rubber market was maintained at a slow pace due to vacation shutdowns. Both the Naugatuck reclaimer and the Buffalo consumer closed down for a time, later resuming operations in a quiet scrap rubber market. Of primary interest to the industry at present are the wage talks being conducted between Goodyear and the United Rubber Workers and the nationwide steel strike, which has served to cloud near term prospects. Prices continued to hold unchanged.

The Rubber Manufacturers Association reports that in the first seven months of the current year, a total of 160,950 long tons of scrap rubber were consumed in the United States with 26,878 long tons consumed in July. As of July 31, 1959, there were 61,627 long tons of scrap rubber in stocks on hand.

(Prices Delivered Akron)

Mixed tires	ton	15.00
Light colored carcass	lb.	.04¾
No. 1 peelings	ton	32.00
No. 2 peelings	ton	28.00
No. 3 peelings	ton	23.00
Buffings	ton	16.00
Truck and Bus S.A.G.	ton	22.00
Passenger S.A.G.	ton	20.00
Natural Rubber Red Tubes	lb.	.07¼
Natural Rubber Black Tubes	lb.	.06½
Butyl Rubber Tubes	lb.	.53¼

Tire Fabrics

Major producers of nylon tire yarn have announced significant price reductions averaging from 9 to 14c per pound. The trade is of the opinion that this move will do much to heighten the competitive struggle now going on between nylon tire cord and Tyrex cord.

While nylon cord has been making increasing inroads into the replacement tire market, Tyrex cord continues to dominate the new equipment market. The newly-announced price reductions for nylon yarn may stimulate its use for original equipment tires.

It is not expected, however, that any major inroads will be made into the original equipment market before the 1961 models are introduced. It is reported that major automobile manufacturers are already committed to the use of Tyrex cord tires in their 1960 models.

Dacron Tire Cord

Meanwhile, a new factor has been introduced into the picture. Firestone has announced that it has obtained excellent results with Dacron cord in passenger car tires. For the past several years, different rubber companies have been experimenting with Dacron as a tire cord material. Dacron is today finding use in automotive hose and V-belts.

Some of the early objections to the use of Dacron as a tire cord were attributed to its brittleness, lack of adhesion and its relatively high price. The trade is now of the opinion that some of these objections have been overcome.

One Firestone official pointed out that it is questionable how soon Dacron tires will become commercial. He claims that Dacron's strength as a tire cord is between Tyrex and nylon.

According to other reports, Firestone has also been experimenting with the use of Terylene as a tire cord. Terylene is a product of Imperial Chemical Industries, Ltd.

On the face of it, it is apparent that the tire cord market is in for some hectic periods in the months that lie ahead. The end result, for the ultimate consumer, will be stronger, safer and better running tires.

(Prices f.o.b. Shipping Point)

Rayon Tire Cord

1100	lb.	.67½
1650	lb.	.67
2200	lb.	.67½

Nylon Tire Cord

210	lb.	1.82
840	lb.	1.47

Rayon Graded Fabric

1100	lb.	.69
1650	lb.	.63½
2200	lb.	.63

Cotton Chafers

8.9 oz. (per square yard)	lb.	.71
9.25 oz. (per square yard)	lb.	.69
11.65 oz. (per square yard)	lb.	.63
14.4 oz. (per square yard)	lb.	.72

Liquid Latex

Natural: The Rubber Manufacturers Association reports that in the first seven months of the current year a total of 45,605 long tons of natural rubber latex were imported into the United States compared with the 38,399 long tons imported into the United States in the first seven months of the preceding year.

As of July 31, 1959, 42,659 long tons of natural latex were consumed in the United States. This compares with the 36,615 long tons of natural latex consumed in the first seven months of 1958.

Natural rubber latex is now selling at close to 45c per pound in car load lots at East Coast ports. These price levels may serve to inhibit some consumers. However, if the consumption pace evident during the first seven months continues for the balance of the year, something approaching 78,000 long tons of natural latex will be consumed in the United States in 1959. Last year, slightly over 70,000 long tons were consumed.

Synthetic: Consumption of all types of synthetic latex in the United States continues to run at about 8,700 long tons a month with all individual types running ahead of 1958 figures. It will be remembered that in 1958, 80,387 long tons of all types of synthetic latex were consumed. It may reasonably be expected that in 1959 more than 100,000 long tons will be consumed.

What with rising prices for natural rubber latex, the statistical position of synthetic latex is bound to gain. By all accounts, then, the synthetic latex segment will enjoy an excellent year in 1959.

Cotton

The price of middling uplands on the New York Cotton Exchange has moved in a range of 140 points since our last report (August 3), high for that period being 33.55c reached on August 3 and 4, and low being 32.15c reached on August 25. The average price of middling uplands for the month of August was 33.17c based upon 21 trading days. This compares with an average of 34.67c in the previous month.

Cotton prices were fairly steady during the past period due to small trade buying orders at a time when there is a limited amount of hedge selling. The crop is moving through government channels at fixed prices, and consumption is running above last year.

The cotton crop continues to make favorite progress in most sections. Cotton exports are still running behind last year despite large sales listed by the government. Textile mills are continuing to bring pressure on Congress to curb imports of foreign made goods. Goods are reported coming in from Europe, India, Japan, China, Hong Kong, and other countries, mostly in the form of apparel.

PRICES OF COMMERCIALLY AVAILABLE

Dry Rubber

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene NF	.4900	1
Butaprene NH	.6500	1
Butaprene NL	.5000	1
Butaprene NXM	.5800	1
Chemigum N1NS	.6400	3
Chemigum N3NS and N5	.5800	2
Chemigum N6	.5000	2
Chemigum N6B	.5000	3
Chemigum N7	.5000	3
Chemigum N8	.5000	3
Chemigum N600	.5000	3
Herecol N-33	.6800	3
Hycar 1001 and 1041	.5800	3
Hycar 1002	.5000	3
Hycar 1014	.6000	3
Hycar 1042 and 1043	.5000	3
Hycar 1051	.5800	3
Hycar 1052	.5000	3
Hycar 1053	.5000	3
Hycar 1072	.6400	3
Hycar 1203	.4600	3
Hycar 1312	.5000	3
Hycar 1411	.6200	3
Hycar 1432	.5900	3
Hycar 1441	.6200	3
Paracril AJ	.4850	2
Paracril ALT	.5000	2
Paracril B and BI	.5000	2
Paracril BLT and BJLT	.5000	2
Paracril C and CLT	.5800	2
Paracril CV	.5900	2
Paracril D	.6500	2
Paracril 18-80	.6000	2
Paracril OZO	.4600	2
Polysar Krynac 800	.5000	3
Polysar Krynac 801	.5800	3
Polysar Krynac 802	.5000	3
Polysar Krynac 803	.5000	3
Tylac 640 and 2830	.5000	3
Tylac 740	.5400	3
Tylac 840, 2241 and 2570	.5800	2
Tylac 1640	.5900	2
Tylac 2430 and 2432	.5500	3

Butadiene-Styrene Types

Ameripol 1000	.2410	3
Ameripol 1001	.2410	3
Ameripol 1002	.2435	3
Ameripol 1006	.2410	3
Ameripol 1006 (crumb)	.2475	3
Ameripol 1007	.2410	3
Ameripol 1009	.2475	3
Ameripol 1009 (crumb)	.2590	3
Ameripol 1011	.2475	3
Ameripol 1012	.2425	3
Ameripol 1012 (crumb)	.2490	3
Ameripol 1013	.2410	3
Ameripol 1013 (crumb)	.2615	3
Ameripol 1500 and 1501	.2410	3
Ameripol 1502	.2410	3
Ameripol 1703	.2060	3
Ameripol 1705	.2035	3
Ameripol 1707	.1910	3
Ameripol 1708	.1910	3
Ameripol 1710	.1885	3
Ameripol 1712	.1885	3
Ameripol 1805	.1550	3
Ameripol 4600	.2410	3
Ameripol 4650	.1820	3
Ameripol 4651	.1770	3
Ameripol 4652	.1425	3
Ameripol 4654	.1870	3
Ameripol 4655	.1820	3
Ameripol 4700	.1750	3
Ameripol 4750	.1545	3
Ameripol 4751	.1400	3
Ameripol 4752	.1600	3
Ameripol 4753	.1480	3
ASRC 1000	.2410	3
ASRC 1001 and 1004	.2410	3
ASRC 1006	.2410	3
ASRC 1009	.2475	3
ASRC 1018	.2700	3
ASRC 1019	.2650	3
ASRC 1500	.2410	3
ASRC 1502	.2410	3
ASRC 1503	.2625	3
ASRC 1703	.2060	3
ASRC 1708	.1910	3
ASRC 1712	.1885	3
ASRC 1713	.1750	3
TSRC 3105 and 3106	.2410	3
ASRC 3110	.2600	3
Baytown 1600	.1930	3
Baytown 1601	.1930	3
Baytown 1602	.1930	3
Baytown 1801	.1760	3
Baytown 1803	.1740	3
C-102 (Shell)	.2300	2
Carbomix 3750	.1820	3
Carbomix 3751	.1545	3
Carbomix 3752	.1845	3
Carbomix 3753	.1640	3
Carbomix 3754	.1770	3
Carbomix 3755	.1470	3
CB-102 (Shell)	.1850	2
Copo 1500	.2410	3
Copo 1502	.2410	3
Copo 1505	.2610	3
Copo 1712	.1885	3
Copo 1773	.2060	3
Copo 1778	.1910	3
Copo 2109	.3000	3
Copo 3900	.2310	3
FR-S 123	.1960	3
FR-S 127	.2600	2
FR-S 141	.2800	3
FR-S 146	.2410	2
FR-S 154	.1885	3
FR-S 155	.1885	2
FR-S 158	.3000	3
FR-S 173	.2060	2
FR-S 178	.1910	3
FR-S 179	.2410	2
FR-S 181	.2410	3
FR-S 1000	.2410	2
FR-S 1001	.2410	3
FR-S 1004	.2410	2
FR-S 1006	.2410	3
FR-S 1007	.2410	3
FR-S 1009	.2475	3
FR-S 1010	.2600	2
FR-S 1012	.2425	3
FR-S 1013	.2500	2
FR-S 1014	.2810	3
FR-S 1500	.2410	2
FR-S 1502	.2410	3
FR-S 1703	.2060	2
FR-S 1710	.1885	3
FR-S 1712	.1885	2
Gentro 1500	.2410	2
Gentro 1712	.1885	2
Gentro-Jet 9152	.2080	2
Gentro-Jet 9153	.1820	2
Gentro-Jet 9154	.1845	2
Gentro-Jet 9250	.1580	2
Gentro-Jet 9251	.1640	2
Gentro-Jet 9252	.1670	2
Gentro-Jet 9275	.1500	2
Naugapol 1016	.2650	3
Naugapol 1018	.2700	3
Naugapol 1019	.2650	3
Naugapol 1021	.3000	3
Naugapol 1022	.2800	3
Naugapol 1023	.2850	3
Naugapol 1503	.2625	3
Naugapol 1504	.2950	3
OB-102 (Shell)	.1825	2
OB-104 (Shell)	.1475	2
OB-106 (Shell)	.1510	2
OB-110 (Shell)	.1410	2
OB-111 (Shell)	.1540	2
OB-113 (Shell)	.1750	2
Philprene 1000	.2410	1
Philprene 1001	.2410	1
Philprene 1006	.2410	1
Philprene 1009	.2475	1
Philprene 1018	.2700	1
Philprene 1019	.2650	1
Philprene 1500	.2410	1
Philprene 1502	.2410	1
Philprene 1503	.2625	1
Philprene 1601	.1930	1
Philprene 1603	.1940	1
Philprene 1605	.1900	1
Philprene 1703	.2060	1
Philprene 1708	.1910	1
Philprene 1712	.1885	1
Philprene 1803	.1740	1
Philprene 1805	.1550	1
Plioflex 1006	.2410	3
Plioflex 1500C	.2410	3
Plioflex 1502	.2410	3
Plioflex 1507	.2410	3
Plioflex 1703	.2060	3
Plioflex 1710C	.1885	3
Plioflex 1712C	.1885	3
Plioflex 1713	.1750	3
Plioflex 1714C	.1725	3
Plioflex 1773	.2060	3
Plioflex 1778	.1910	3
Polysar Kryflex 200	.2510	3
Polysar Krylene	.2410	3
Polysar Krylene NS	.2410	3
Polysar Krynol 651	.1885	3
Polysar Krynol 652	.1910	3
Polysar S	.2410	3
Polysar S-50	.2410	3
Polysar S-X 371	.2550	3
Polysar SS-250	.2875	3
S-1000	.2300	3
S-1002	.2325	3
S-1006	.2300	3
S-1009	.2400	3
S-1011	.2325	3
S-1013	.2300	3
S-1100	.1850	2
S-1500	.2300	3
S-1502	.2300	3
S-1600	.1825	3
S-1602	.1825	3
S-1605	.1800	2
S-1703	.1950	3
S-1707	.1800	2
S-1709	.1775	2
S-1712	.1775	3
S-1803	.1650	2
S-1804	.1750	3
S-7701	.1850	2
SP-103 (Shell)	.2900	2
Synpol 1000	.2410	1
Synpol 1001	.2410	1
Synpol 1002	.2435	1
Synpol 1006	.2410	1
Synpol 1007	.2410	1
Synpol 1009	.2475	1
Synpol 1012	.2425	1
Synpol 1061	.2410	1
Synpol 1500	.2410	1
Synpol 1502	.2410	1
Synpol 1551	.2410	1
Synpol 1703	.2060	1
Synpol 1707	.1910	1
Synpol 1708	.1910	1
Synpol 1711	.1900	1
Synpol 1712	.1885	1
Synpol 8000	.2410	1
Synpol 8150	.1930	1
Synpol 8200	.1910	1
Synpol 8201	.1750	1
Synpol 8250	.1740	1
Synpol 8253	.1584	1
Synpol 8254	.1545	1
Synpol X 274	.2550	1

Butyl Rubbers

Enjay Butyl 035 and 150	.2300	3
Enjay Butyl 165 NS	.2400	3
Enjay Butyl 215	.2300	3
Enjay Butyl 217	.2300	3
Enjay Butyl 218	.2300	3
Enjay Butyl 268 NS	.2400	3
Enjay Butyl 325	.2300	2
Enjay Butyl 365 NS	.2400	3
Polysar Butyl 100	.2450	3
Polysar Butyl 101	.2775	3
Polysar Butyl 200 and 300	.2450	3
Polysar Butyl 301	.2550	3
Polysar Butyl 400	.2450	3

Chlorosulfonated Polyethylene

Hypalon 20	.7000	3
Hypalon 30	.7000	3

Fluoroelastomers

Kel-F Fluorel	$15.00	2
Kel-F 3700	$16.00	2
Kel-F 5500	$16.00	2
Viton A	$15.00	2
Viton A-HV	$15.00	2

Neoprene

	(prices f.o.b.)	
Neoprene Types AC and CG	.5500	3
Neoprene Type AD	.5500	3
Neoprene Type FB	.6500	3
Neoprene Type GN	.4100	3
Neoprene Type GN-A	.4100	3
Neoprene Type GRT	.4200	3
Neoprene Type KNR	.7500	3
Neoprene Type S	.4200	3
Neoprene Type W	.3900	3
Neoprene Type WB	.4100	3
Neoprene Type WHV	.3900	3
Neoprene Type WRT	.4500	3
Neoprene Type WX	.4100	3

Polysulfide Rubbers

	(prices f.o.b.)	
Thiokol Type A	.5000	3
Thiokol Type FA	.6900	3
Thiokol Type ST	1.2500	3

SYNTHETIC RUBBER POLYMERS

Dry Rubber (Cont'd.)

Silicone Rubbers*

(prices f.o.b.)

GE (compounded)	2.50
GE Silicone Gum (not compounded)	4.00
Silastic (compounded)	2.50
Silastic (gums)	4.00
Union Carbide (gums)	4.00
Union Carbide (compounds)	2.50

Latex

(per pound carload)

Butadiene-Acrylonitrile Types

Butaprene N-300	.4600
Butaprene N-400 and N-401	.5400
Chemigum 200	.4900
Chemigum 235 and 236	.5400
Chemigum 245	.4600
Chemigum 246	.4600
Chemigum 247	.4600
Chemigum 248	.4600
Hycar 1512	.4500
Hycar 1551	.5300
Hycar 1552	.4500
Hycar 1561	.5300
Hycar 1562	.4500
Hycar 1571	.5300
Hycar 1572	.4500
Hycar 1577	.4500

Butadiene-Styrene Types

CL-101 (Shell)	.2800
Copo 2101	.3000
Copo 2102	.3200
Copo 2105	.3200
Copo 2108	.3375
Copo 2110	.3200
Copo X-800	.2775
FR-S 2000	.2775
FR-S 2001	.2775
FR-S 2002	.3000
FR-S 2003	.3050
FR-S 2004	.3050
FR-S 2006	.2900
FR-S 2105	.3200
Naugatex 2000	.3375
Naugatex 2001	.3375
Naugatex 2002	.3500
Naugatex 2006	.3900
Naugatex 2105	.3600
Naugatex 2107	.3600
Naugatex 2108	.3600
Naugatex 2113	.3400
Nitrex 2612	.5000
Nitrex 2614	.4600
Nitrex 2614 A	.4600
Nitrex 2615	.5100
Nitrex 2615-A	.5100
Nitrex 2616	.5800
Nitrex 2617	.4600
Nitrex 2617-A	.4600
Nitrex 2619	.5700
Nitrex 2620	.5000
Nitrex 2625	.5000
Nitrex 2625-A	.5000
Nitrex J-6849	.5400
Pliolite 2000	.2775
Pliolite 2001	.2775
Pliolite 2076	.2900
Pliolite 2104	.3200
Pliolite 2105	.3200
Pliolite 2107	.3200
Pliolite 2108	.3000
S-2000 and S-2006	.2600
S-2101	.2600
S-2105	.2800
S-2108	.2900

Neoprene

Neoprene Latex 60	.4000
Neoprene Latex 571	.3700
Neoprene Latex 572	.3900
Neoprene Latex 601-A	.4000
Neoprene Latex 673	.5000
Neoprene Latex 735	.3800
Neoprene Latex 736	.3800
Neoprene Latex 842-A	.3700
Neoprene Latex 950	.4700

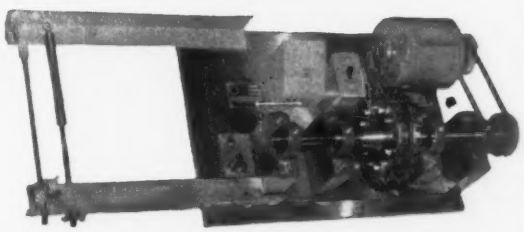
Polysulfide Rubbers

Thiokol Type MX	.8000
Thiokol Type WD-2	1.2500
Thiokol Type WD-6	.8000

Notes: (1) Freight allowed. (2) Freight extra. (3) Freight prepaid. *Covers a wide range of compounds. Readers are urged to check specific prices with producers.

B. F. GOODRICH-

DISC COMPRESSION CORD TESTER



Indicates most accurately simulated road test results of cord flexure and failure.

Exclusive Manufacturers

FERRY MACHINE CO., KENT, OHIO

Export Sales Columbian Carbon, Intl., N. Y.

EAGLE-PICHER

Lead & Zinc Compounds

meet the specific demands of the rubber industry . . .

Eagle-Picher manufactures a comprehensive line of both lead and zinc compounds for the rubber industry. Rigid product control is maintained from the ore to the finished product. More than a century of experience assures you of customer service unequalled in the field.

Zinc Oxides	Litharge
Basic White Lead Silicate	Sublimed Litharge
Basic Carbonate of White Lead	Red Lead (95% 97% 98%)
Sublimed White Lead	Sublimed Blue Lead

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West Coast Sales Agent

THE BUNKER HILL COMPANY, Chemical Products Division

Seattle • Portland • Oakland • San Francisco • Los Angeles • Kellogg, Idaho

STATISTICS of the industry

PERTINENT INDUSTRY DATA

Natural Rubber in the United States

(Including Latex and Guayule)

(All Quantities in Long Tons)

Year	New Supply	Consumption	Re-Exports	Stocks On Hand at End of Period
1931	501,788	355,200	25,609	322,000
1932	414,668	336,700	20,937	379,000
1933	418,902	412,400	20,576	365,000
1934	463,018	462,500	23,856	355,000
1935	467,146	493,500	11,391	303,000
1936	488,145	575,000	12,582	223,000
1937	600,479	543,600	7,902	262,204
1938	411,983	437,031	5,652	231,500
1939	499,473	592,000	13,125	125,800
1940	818,243	648,500	7,060	288,864
1941	1,029,007	775,000	5,376	533,344
1942	282,653	376,791	10,856	422,714
1943	55,329	317,634	20,815	139,594
1944	107,834	144,113	9,665	93,650
1945	135,672	105,429	6,743	118,715
1946	400,687	277,597	4,338	237,467
1947	688,354	562,661	4,101	129,038
1948	735,227	627,332	6,673	141,541
1949	660,792	574,522	6,253	106,619
1950	802,249	720,268	8,644	89,215
1951	733,048	454,015	2,603	76,569
1952	805,997	453,846	3,024	95,260
1953	647,150	553,473	8,376	112,316
1954	596,848	596,285	7,443	104,543
1955	635,174	634,800	10,611	110,105
1956	580,510	563,095	11,300	115,949
1957	499,121	539,761	10,146	100,901
1958	474,409	484,492	20,085	76,491
1958:				
July	27,521	34,235	3,107	85,577
Aug.	39,057	39,444	1,369	85,666
Sept.	38,321	44,814	1,019	82,622
Oct.	40,267	48,957	1,550	77,859
Nov.	42,484	43,877	3,140	75,335
Dec.	57,067	46,600	2,000	75,325
1959:				
Jan.	54,950	49,913	1,438	82,487
Feb.	48,917	47,345	1,561	79,657
Mar.	48,584	51,991	2,131	78,871
Apr.	34,828	40,850	1,700	78,900
May	45,451	38,777	1,967	82,983
June	45,111	48,570	2,350	85,010

Source: U. S. Department of Commerce.

U. S. Imports of Natural Rubber

Year	Dry: Long Tons	Dry: Declared Value	Latex: Long Tons	Latex: Declared Value	Total Imports
1936	467,064	152,072,496	19,852	6,659,899	486,916
1937	574,600	237,307,041	23,185	10,213,670	597,785
1938	397,640	125,373,864	11,944	4,168,127	409,584
1939	469,946	167,586,780	27,437	10,467,552	497,383
1940	781,202	303,308,823	33,789	14,593,466	814,991
1941	989,498	401,976,317	34,797	15,965,627	1,024,245
1942	266,276	112,537,426	10,646	5,630,667	276,922
1943	50,358	31,369,198	1,890	1,312,202	52,248
1944	103,847	73,908,549	3,091	2,092,211	106,938
1945	134,408	95,814,102	4,773	3,115,853	139,181
1946	376,502	228,796,110	8,421	5,843,085	384,923
1947	691,087	306,951,814	17,542	9,787,722	708,629
1948	702,293	290,849,177	32,745	18,288,223	735,038
1949	630,808	225,343,624	29,743	14,968,650	660,551
1950	747,109	416,222,598	54,401	41,764,486	801,510
1951	677,874	727,343,348	54,963	80,178,309	732,837
1952	756,987	578,179,519	48,228	40,563,116	805,215
1953	571,635	284,909,223	75,511	46,353,333	647,146
1954	522,364	219,098,143	74,483	42,755,029	596,847
1955	542,507	360,435,303	92,825	80,163,114	635,332
1956	499,479	334,990,045	71,709	61,795,844	564,321
1957	475,958	291,337,628	78,567	58,249,788	554,174
1958	406,059	153,127,066	67,593	45,047,040	473,652
1958:					
Nov.	37,345	19,262,061	4,074	3,236,086	41,419
Dec.	46,542	25,407,908	7,951	5,400,581	54,493
1959:					
Jan.	46,376	26,671,747	8,574	5,982,352	54,950
Feb.	43,171	25,654,219	5,746	3,870,366	48,917
Mar.	41,545	24,138,084	7,039	4,775,577	48,584
Apr.	38,005	21,869,881	6,342	4,372,505	44,347
May	39,444	23,371,117	6,006	4,990,906	45,450

Source: Bureau of the Census, U. S. Department of Commerce.

World Production of Natural Rubber

(Including Latex)

(Long Tons)

Year	Malaya	Indonesia	Ceylon	Viet Nam & Cambodia	Latin America*	Rest of World*	Total*
1947	646,362	277,951	89,000	38,128	34,928	172,782	1,260,000
1948	698,189	432,349	95,000	43,935	29,158	225,557	1,525,000
1949	671,503	432,996	89,500	43,010	27,318	225,659	1,490,000
1950	694,090	696,472	113,500	48,482	26,902	280,299	1,860,000
1951	605,346	814,406	105,000	52,136	29,777	278,262	1,885,000
1952	584,238	750,494	96,500	63,134	35,475	261,211	1,790,000
1953	574,390	692,164	98,610	74,545	35,318	250,182	1,725,000
1954	584,435	738,670	93,935	78,024	26,833	280,112	1,802,500
1955	639,128	733,786	93,830	80,172	6,000	344,584	1,897,500
1956	568,550	686,667	95,389	89,072	22,457	336,015	1,857,000
1957	638,706	684,515	98,164	58,440	28,351	381,824	1,890,000
1958	663,644	614,561	100,196	103,613	26,268	446,718	1,955,000
1959:							
Jan.	64,771	42,685	9,066	9,998	4,106	59,374	190,000
Feb.	49,132	47,544	4,713	762	2,158	40,691	145,000
Mar.	49,631	57,626	4,375	2,656	2,906	35,306	152,500
Apr.	48,338	60,436	6,260	5,988	600	33,378	155,000

Source: International Rubber Study Group. * Estimated.

World Consumption of Natural and Synthetic Rubber

(Including Latex)

(Long Tons)

Year	United States	United Kingdom	Canada	Europe*	Rest of World*	Total*
1946	1,039,296	126,770	39,196	145,000	115,804	1,467,500
1947	1,122,327	156,399	61,452	242,500	153,548	1,735,000
1948	1,069,404	196,286	62,121	392,000	182,379	1,902,500
1949	988,903	186,622	56,362	446,500	207,388	1,887,500
1950	1,258,557	222,425	68,695	448,500	287,055	2,285,000
1951	1,214,298	238,101	70,809	476,500	314,941	2,312,500
1952	1,261,413	202,179	67,099	550,000	254,901	2,335,000
1953	1,338,309	211,453	73,394	521,000	343,606	2,500,000
1954	1,233,012	247,612	71,656	544,250	408,094	2,505,000
1955	1,529,699	266,804	84,528	630,000	464,250	2,980,000
1956	1,436,482	232,345	91,458	775,500	489,215	3,025,000
1957	1,464,640	239,021	88,379	777,250	565,710	3,135,000
1958	1,364,404	238,439	83,904	905,000	638,353	3,230,000
1959:						
Jan.	139,549	21,118	7,735	87,250	59,348	315,000
Feb.	134,738	19,456	8,879	76,750	50,180	290,000
Mar.	147,080	21,967	8,535	64,750	52,668	295,000
Apr.	121,222	20,163	8,819	87,000	50,296	287,500

Source: International Rubber Study Group. * Estimated.

Rim Production

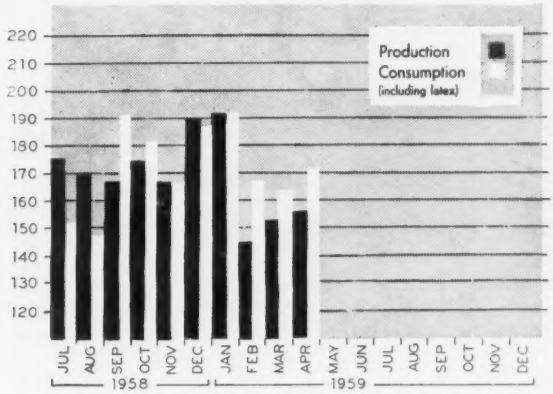
	1954	1955	1956	1957	1958
Passenger Car	25,952,322	38,052,080	27,109,610	27,301,567	20,665,688
Truck & Bus	4,463,689	6,642,329	6,315,428	5,468,223	3,887,910
Agricultural	1,279,040	1,931,768	1,416,938	1,368,127	1,218,240
Earth Mover	21,536	38,849	88,812	67,289	61,883
Total	31,734,587	46,705,036	34,930,788	34,205,206	25,833,721

	1959					
	Feb.	Mar.	Apr.	May	June	July
Passenger Car	2,265,105	2,700,787	2,603,391	2,498,117	2,660,094	1,816,678
Truck and Bus	448,899	589,507	604,155	501,362	512,843	449,744
Agricultural	101,912	148,987	192,303	153,822	188,060	74,252
Earth Mover	6,222	13,893	14,469	9,027	13,070	6,419
	2,822,138	3,453,174	3,414,318	3,162,328	3,374,067	2,347,093

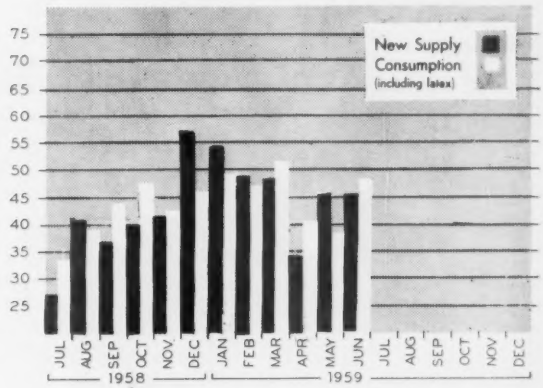
Source: The Tire & Rim Association, Inc.

STATISTICS at a glance

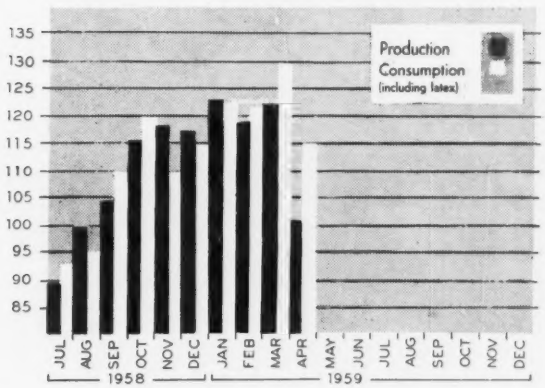
NATURAL RUBBER—WORLD
(thousands of long tons)



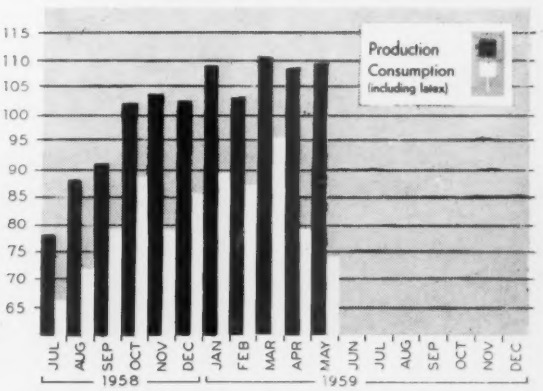
NATURAL RUBBER—UNITED STATES
(thousands of long tons)



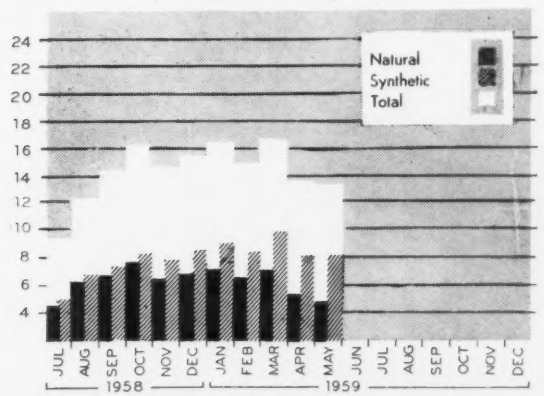
SYNTHETIC RUBBER—WORLD
(thousands of long tons)



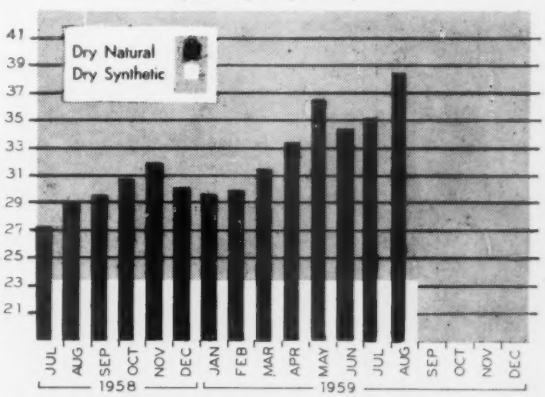
SYNTHETIC RUBBER—UNITED STATES
(thousands of long tons)



LATEX CONSUMPTION—UNITED STATES
(thousands of long tons)



PRICES—NATURAL AND SYNTHETIC
(cents per pound)



Synthetic Rubber in the United States

(All Quantities in Long Tons)

New Supply

Year	GR-S	Neoprene	Butyl	N-Type	Total
1949	310,529	35,215	54,046	11,072	410,932
1950	378,887	50,067	60,915	12,037	501,906
1951	704,529	58,907	76,475	15,333	855,244
1952	654,854	65,745	81,630	16,228	818,447
1953	680,728	80,495	79,801	20,198	861,222
1954	490,405	69,150	58,802	21,396	639,753
1955	801,145	91,357	56,179	32,623	982,304
1956	876,982	99,412	75,873	34,547	1,086,814
1957	913,321	110,721	67,418	33,618	1,125,078
1958	872,565	97,806	54,113	32,431	1,056,915
1958:					
Sept.	75,764	8,586	4,363	3,185	91,898
Oct.	83,601	9,283	5,527	3,652	102,063
Nov.	85,044	10,394	4,384	3,642	103,464
Dec.	86,219	9,201	4,174	3,263	102,857
1959:					
Jan.	90,622	9,991	5,305	3,304	109,222
Feb.	83,662	10,256	5,898	3,407	103,223
Mar.	92,315	9,690	6,226	3,818	112,049
Apr.	88,509	10,455	6,301	3,324	108,589
May	89,625	10,249	6,467	3,610	109,951

Consumption

1950	416,230	43,781	66,348	11,930	538,289
1951	626,444	48,887	70,500	13,066	758,897
1952	666,420	55,522	71,229	13,866	807,037
1953	624,181	65,900	77,826	16,929	784,836
1954	500,345	57,203	61,464	17,715	636,727
1955	741,997	72,876	53,991	26,035	894,899
1956	727,789	74,887	49,615	24,976	877,267
1957	767,218	75,461	55,413	25,187	923,279
1958:	730,196	69,694	53,432	26,590	880,912
1958:					
Sept.	65,256	6,647	4,725	2,538	79,166
Oct.	73,699	7,378	4,982	2,759	88,818
Nov.	66,294	6,448	4,419	2,562	79,723
Dec.	71,731	6,955	4,897	2,606	86,189
1959:					
Jan.	74,223	7,198	5,359	2,857	89,636
Feb.	72,558	6,885	5,256	2,694	87,393
Mar.	78,792	7,444	5,687	3,166	95,089
Apr.	64,547	7,493	4,758	2,941	79,739
May	60,870	6,914	3,978	2,853	74,615

Exports

1950	900	4,826	31	1,895	7,652
1951	463	6,825	216	1,725	9,249
1952	9,467	9,813	126	2,695	22,101
1953	7,692	11,494	237	3,245	22,668
1954	11,069	12,062	2,831	4,155	30,117
1955	60,704	18,098	9,895	4,593	93,290
1956	112,366	21,909	8,699	6,194	149,168
1957	157,977	30,242	8,748	6,377	203,344
1958	142,069	31,337	13,793	6,718	193,917
1958:					
Oct.	12,292	2,547	1,407	553	16,799
Nov.	11,872	3,010	1,306	639	28,527
Dec.	12,634	2,484	1,258	520	16,896
1959:					
Jan.	11,962	3,430	1,579	520	17,491
Feb.	11,615	2,404	1,169	648	15,836
Mar.	16,295	2,712	2,238	467	21,712
Apr.	19,154	3,741	2,135	527	25,557
May	21,281	2,942	2,587	642	27,452

Stocks

1949	77,731	4,654	12,224	3,433	98,042
1950	36,942	5,733	7,243	2,840	52,758
1951	105,271	8,379	12,481	3,821	129,912
1952	83,861	8,535	22,716	3,875	118,987
1953	135,153	11,480	24,866	4,346	175,845
1954	115,499	11,349	19,267	4,280	150,395
1955	108,989	12,220	10,500	6,030	137,739
1956	151,763	14,077	28,744	7,934	202,518
1957	140,199	18,843	31,489	7,454	197,985
1958	143,533	15,688	18,770	7,292	185,283
1958:					
Nov.	140,673	15,373	20,192	7,273	183,511
Dec.	143,533	15,688	18,770	7,292	185,283
1959:					
Jan.	147,243	15,638	16,827	7,335	187,043
Feb.	148,606	15,990	16,339	7,468	188,403
Mar.	146,971	14,701	14,441	7,753	183,866
Apr.	147,867	14,848	12,496	7,728	182,939
May	156,209	15,024	12,710	7,820	191,763

Source: U. S. Department of Commerce.

Natural and Synthetic Rubber Latex in the United States

(All Quantities in Long Tons)

New Supply

Year	Natural	GR-S	Neoprene	N-Type	Total Synthetic	Grand Total
1945	4,768	15,176	7,077	.....	22,253	27,021
1946	8,012	24,810	13,595	.....	38,405	46,417
1947	17,675	22,474	6,089	.....	28,563	46,238
1948	32,630	21,494	5,022	.....	26,516	59,146
1949	29,974	21,357	3,651	.....	25,008	54,982
1950	54,401	31,339	5,725	.....	37,064	91,465
1951	54,963	32,972	6,866	2,948	42,786	97,749
1952	48,228	42,273	7,598	4,164	54,035	102,263
1953	75,511	48,112	9,026	5,844	62,982	138,493
1954	74,483	48,379	8,214	6,866	63,459	137,942
1955	92,754	69,364	10,432	10,798	90,594	183,348
1956	72,013	69,720	10,642	10,650	91,012	163,025
1957	72,252	74,535	10,403	11,420	96,358	168,610
1958	67,591	65,669	10,679	11,560	87,908	155,499
1958:						
July	3,158	3,645	677	893	5,215	8,373
Aug.	5,140	5,474	892	1,103	7,469	12,609
Sept.	5,034	6,165	1,075	1,173	8,413	13,447
Oct.	6,994	7,617	1,170	1,308	10,095	17,089
Nov.	4,074	7,307	1,156	1,205	9,668	13,742
Dec.	7,950	6,891	986	1,033	8,910	16,860
1959:						
Jan.	8,574	7,801	1,049	1,104	9,954	18,528
Feb.	5,746	7,578	998	1,161	9,737	15,483
Mar.	7,039	8,587	1,013	1,269	10,869	17,908
Apr.	6,342	6,730	1,301	911	8,942	15,284
May	6,007	6,583	1,146	1,156	8,885	14,892

Consumption[1]

1945	3,886	14,500	6,800	....	21,300	25,186
1946	5,714	23,500	13,000	....	36,500	42,214
1947	13,909	22,500	6,500	....	29,000	42,909
1948	28,489	21,500	5,250	....	26,750	55,239
1949	36,117	21,500	3,750	....	25,250	61,367
1950	56,138	31,000	5,500	....	36,500	92,638
1951	46,750	31,031	6,279	2,628	39,938	86,688
1952	53,567	40,562	7,368	3,093	51,023	104,590
1953	67,375	46,473	7,981	3,654	58,108	125,483
1954	75,931	44,173	7,251	4,507	55,931	131,862
1955	86,478	63,982	8,736	8,495	81,213	167,691
1956	74,082	62,762	8,708	8,021	79,491	153,573
1957	75,009	68,305	9,039	8,630	85,974	160,983
1958	70,183	60,283	9,555	10,549	80,387	150,570
1958:						
July	4,483	3,433	667	687	4,787	9,270
Aug.	6,030	4,654	811	1,001	6,466	12,496
Sept.	6,677	5,779	870	993	7,642	14,319
Oct.	7,643	6,534	1,039	1,094	8,667	16,310
Nov.	6,470	6,009	847	1,082	7,938	14,408
Dec.	6,748	6,893	854	1,081	8,828	15,576
1959:						
Jan.	7,184	6,886	925	1,244	9,055	16,239
Feb.	6,489	7,083	859	1,009	8,951	15,440
Mar.	7,052	7,275	1,054	1,208	9,537	16,589
Apr.	5,793	5,629	1,104	1,169	7,902	13,695
May	5,429	5,962	995	1,112	8,069	13,498

Stocks at End of Period

1945	3,121	....	....	....	....	3,121
1946	4,865	....	....	....	....	4,865
1947	5,033	....	....	....	....	5,033
1948	11,235	....	....	....	....	11,235
1949	5,063	....	....	....	....	5,063
1950	4,927	....	....	....	....	4,927
1951	4,752	3,727	1,245	532	5,504	10,256
1952	6,201	5,040	1,019	902	6,961	13,162
1953	13,532	4,794	1,117	721	6,632	20,164
1954	11,133	5,134	1,087	811	7,032	18,165
1955	13,203	6,980	1,236	1,807	10,203	23,406
1956	12,064	7,451	1,384	1,558	10,393	22,457
1957	14,454	8,347	1,267	1,974	11,588	26,042
1958	8,900	7,672	1,663	2,519	11,854	20,754
1958:						
July	15,516	6,693	1,312	1,990	9,995	25,511
Aug.	13,750	7,166	1,195	2,049	10,410	24,160
Sept.	12,482	6,842	1,354	2,096	10,616	23,098
Oct.	10,324	7,129	1,365	2,229	10,376	20,700
Nov.	8,795	7,810	1,498	2,530	11,838	20,633
Dec.	8,900	7,672	1,663	2,519	11,854	20,754
1959:						
Jan.	10,025	7,822	1,551	2,418	11,791	21,816
Feb.	10,482	7,753	1,488	2,535	11,776	22,258
Mar.	9,375	8,209	1,441	2,670	12,320	21,695
Apr.	8,599	7,859	1,458	2,379	11,696	20,295
May	9,718	7,917	1,417	2,398	11,732	21,450

Source: U. S. Department of Commerce.
Note: (1) GR-S and Neoprene consumption estimated through 1950.

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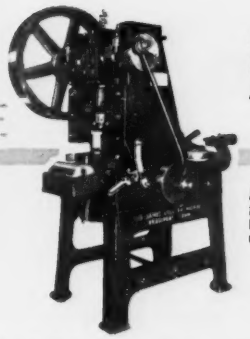

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Precision cutting for both high speed production or short runs.

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- Short runs
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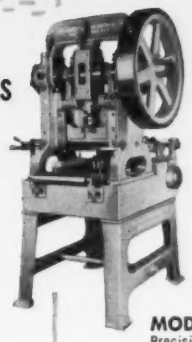
- Half and full soles
- Mechanical rubber goods



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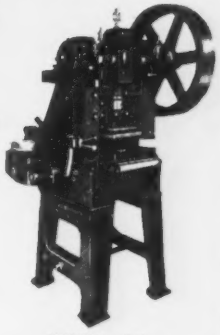

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Automotive Pneumatic Casings

(Thousands of Units)

	Shipments					
	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1951 (total)	32,153	44,612	1,677	78,442	83,405	8,765
Passenger Car	26,729	34,226	723	61,678	65,546	6,973
Truck and Bus	5,424	10,386	954	16,764	17,859	1,791
1952 (total)	29,484	54,342	1,520	85,346	90,411	14,110
Passenger Car	24,106	45,458	741	70,305	74,341	11,251
Truck and Bus	5,378	8,884	779	15,041	16,070	2,859
1953 (total)	37,949	55,124	1,543	94,617	96,150	15,720
Passenger Car	33,106	45,798	809	79,713	81,455	13,044
Truck and Bus	4,843	9,326	734	14,904	14,696	2,676
1954 (total)	33,333	55,155	1,753	90,241	89,141	14,762
Passenger Car	29,741	47,044	928	77,713	76,794	12,217
Truck and Bus	3,591	8,111	826	12,528	12,347	2,545
1955 (total)	47,374	59,246	1,879	108,499	112,178	18,778
Passenger Car	42,574	50,189	966	93,730	97,223	15,963
Truck and Bus	4,800	9,057	912	14,769	14,955	2,815
1956 (total)	35,422	62,146	1,757	99,325	100,406	79,872
Passenger Car	30,873	53,252	875	85,000	85,546	16,494
Truck and Bus	4,548	8,894	883	14,325	14,859	3,378
1957 (total)	36,765	65,150	1,733	103,649	106,940	250,536
Passenger Car	32,725	56,663	889	90,217	93,542	210,146
Truck and Bus	4,053	8,546	846	13,432	13,398	40,384
1958 (total)	26,783	70,797	1,348	98,928	96,563	20,939
Passenger Car	23,408	61,570	717	85,696	83,636	17,778
Truck and Bus	3,375	9,226	631	13,232	12,927	3,161
1958:						
July (total)	2,020	7,442	111	9,573	7,288	18,615
Passenger Car	1,756	6,502	60	8,318	6,368	15,501
Truck and Bus	265	940	51	1,255	920	3,114
Aug. (total)	1,055	6,679	115	7,848	7,762	18,521
Passenger Car	847	5,807	57	6,711	6,753	15,535
Truck and Bus	208	871	57	1,137	1,009	2,986
Sept. (total)	1,442	6,365	105	7,912	8,277	18,925
Passenger Car	1,170	5,425	64	6,659	7,134	16,045
Truck and Bus	273	940	41	1,253	1,143	2,880
Oct. (total)	1,838	6,476	140	8,454	9,344	19,913
Passenger Car	1,522	5,369	81	6,972	7,983	17,134
Truck and Bus	316	1,106	59	1,482	1,361	2,779
Nov. (total)	3,369	4,320	100	7,788	8,393	20,403
Passenger Car	3,056	3,651	58	6,765	7,182	17,420
Truck and Bus	313	669	42	1,023	1,211	2,983
Dec. (total)	4,057	4,711	124	8,892	9,376	20,939
Passenger Car	3,701	3,977	61	7,739	8,046	17,778
Truck and Bus	356	734	63	1,153	1,330	3,161
1959:						
Jan. (total)	2,960	6,742	104	9,806	10,184	21,399
Passenger Car	2,631	6,028	57	8,716	8,859	17,998
Truck and Bus	329	714	47	1,090	1,325	3,401
Feb. (total)	2,805	5,611	135	8,551	10,270	23,019
Passenger Car	2,442	4,932	60	7,434	8,962	19,435
Truck and Bus	364	679	74	1,117	1,308	3,584
Mar. (total)	3,336	7,103	117	10,557	11,350	23,862
Passenger Car	2,930	6,261	62	9,253	9,959	20,181
Truck and Bus	406	842	56	1,304	1,391	3,680
Apr. (total)	3,594	7,297	109	10,999	8,025	20,872
Passenger Car	3,115	6,390	65	9,569	6,986	17,597
Truck and Bus	479	907	44	1,430	1,039	3,276
May (total)	3,291	6,356	79	9,726	7,796	18,727
Passenger Car	2,848	5,617	38	8,504	6,853	15,721
Truck and Bus	442	738	41	1,222	843	3,006
June (total)	3,392	6,756	90	10,237	10,294	19,088
Passenger Car	2,903	5,936	46	8,886	9,022	16,134
Truck and Bus	488	820	44	1,352	1,272	2,954

Source: The Rubber Manufacturers Association, Inc.

Automobile Production in U. S.

(Civilian Production Only)

Year	Passenger Cars	Trucks	Total	Year	Passenger Cars	Trucks	Total
1939	2,866,796	704,308	3,571,104	1949	5,108,841	1,123,736	6,232,577
1940	3,692,328	721,637	4,413,965	1950	6,665,836	1,332,263	7,998,099
1941	3,744,500	875,381	4,619,681	1951	5,337,729	1,420,432	6,758,161
1942	220,814	133,083	353,897	1952	4,320,794	1,212,790	5,533,584
1943	0	4,501	4,501	1953	6,121,787	1,202,196	7,323,983
1944	0	124,819	124,819	1954	5,558,897	1,038,045	6,596,942
1945	83,792	313,643	397,435	1955	7,920,186	1,245,018	9,165,204
1946	2,148,699	930,760	3,079,429	1956	5,816,109	1,100,417	6,916,526
1947	3,558,178	1,220,634	4,778,812	1957	6,113,344	1,097,006	7,210,350
1948	3,909,270	1,363,856	5,132,090	1958	4,257,812	874,278	5,132,090
1958:							
Jan.	478,416	79,790	558,206	July	316,408	65,047	381,455
Feb.	396,221	71,024	467,245	Aug.	194,974	55,221	250,195
Mar.	359,464	73,658	433,122	Sept.	102,687	46,353	149,040
Apr.	322,482	73,886	396,368	Oct.	272,241	69,934	342,175
May	352,076	75,291	427,367	Nov.	511,885	93,282	605,167
June	342,228	70,652	412,880	Dec.	608,730	100,140	708,870
1959:							
Jan.	539,451	96,044	635,495	July	548,524	114,687	663,211
Feb.	476,977	99,973	576,950	Aug.	.....	.....	.....
Mar.	575,012	111,355	686,367	Sept.	.....	.....	.....
Apr.	585,789	116,910	702,699	Oct.	.....	.....	.....
May	545,001	114,995	659,996	Nov.	.....	.....	.....
June	554,878	119,544	674,422	Dec.	.....	.....	.....

Source: Automobile Manufacturers Association.
Note: Figures are based on factory sales. Revisions are made from time to time in these figures and the latest issue should be consulted for accuracy.

Automotive Inner Tubes

(Thousands of Units)

	Shipments					
Year	Original Equipment	Replacement	Export	Total	Production	Inventory End of Period
1946	15,327	59,357	1,424	76,108	77,251	3,820
1947	25,046	46,560	2,483	74,088	79,181	8,059
1948	26,833	40,548	1,119	68,499	70,033	9,641
1949	31,521	31,450	887	63,858	65,114	10,657
1950	41,240	42,671	811	84,723	80,179	...
1951	32,151	32,284	1,071	65,507	67,249	10,094
1952	29,451	32,985	1,014	63,449	65,073	12,036
1953	37,957	36,072	878	74,907	74,425	11,874
1954	25,071	35,576	945	61,593	48,279	9,519
1955	5,001	33,387	1,001	39,389	35,900	6,833
1956	3,100	32,358	1,040	36,498	34,405	6,109
1957	3,046	35,687	1,076	39,806	39,774	80,077
1958	2,678	37,872	870	41,420	41,266	8,602
1958:						
Oct.	244	3,238	84	3,567	3,768	7,869
Nov.	264	2,575	60	2,899	3,319	8,372
Dec.	288	3,029	94	3,411	3,491	8,602
1959:						
Jan.	287	4,450	63	4,800	3,806	7,536
Feb.	311	3,924	81	4,316	4,094	7,364
Mar.	339	4,013	83	4,435	4,459	7,629
Apr.	389	3,474	66	3,928	3,380	7,219
May	363	2,853	59	3,275	2,752	6,849
June	392	3,421	59	3,872	3,683	7,000

Source: The Rubber Manufacturers Association, Inc.

Vinyl and Vinyl Copolymer Resins—Sales

(Thousands of Pounds—Resin Content)

	Polyvinyl Chloride and Copolymer Resins							All Other Vinyl Resins		
	Film	Sheeting	Molding & Extrusion	Textile & Paper Treating	Flooring	Protective Coatings	All Other Uses	Adhesives	All Other Uses	Grand Total
1953	63,691	62,385	129,215	52,353	22,152	22,823	27,790	22,411	77,478	480,299
1954	69,943	56,588	147,284	49,546	34,890	23,676	35,148	26,609	74,090	517,773
1955	83,276	51,424	183,736	64,223	56,357	27,439	53,868	31,853	105,644	657,821
1956	78,063	55,598	206,726	62,931	65,384	28,522	71,859	36,565	115,151	720,799
1957	90,543	56,344	216,517	66,392	81,357	31,519	50,637	41,665	113,396	748,370
1958	72,404	67,594	214,701	63,050	113,583	28,913	68,307	52,904	117,752	801,208
1958:										
Sept.	6,696	6,971	20,029	6,194	10,340	2,370	7,236	4,308	11,349	75,493
Oct.	7,358	6,975	23,989	7,116	11,555	2,528	8,580	4,859	13,560	86,520
Nov.	5,760	6,431	20,239	6,024	9,938	2,134	7,227	4,015	10,439	72,207
Dec.	5,954	7,871	22,162	6,110	9,843	1,996	9,376	3,815	11,292	78,419
1959:										
Jan.	5,959	8,050	23,818	5,139	11,708	2,442	5,988	3,533	12,648	79,285
Feb.	5,590	9,094	22,638	5,052	11,176	2,325	7,312	4,139	12,601	79,927
Mar.	7,088	8,735	25,086	5,514	13,568	2,537	8,014	4,919	14,257	89,718
Apr.	7,526	10,390	27,226	5,951	14,096	3,038	8,376	5,182	15,282	97,067
May	6,765	10,664	25,561	6,466	13,762	2,583	7,614	4,662	13,972	92,049
June	7,517	11,227	24,711	6,231	12,073	2,625	8,447	5,022	14,783	92,636

Source: Chemical Division, U. S. Tariff Commission.

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Rubber Industry Employment Earnings and Hours

All Rubber Products

Mo.	1958 Production Workers (thousands)	1958 Average Weekly Earnings	1958 Average Weekly Hours	1958 Average Hourly Earnings	1959 Production Workers (thousands)	1959 Average Weekly Earnings	1959 Average Weekly Hours	1959 Average Hourly Earnings
Jan.	200.9	$87.48	38.2	$2.29	199.1	$100.28	41.1	$2.44
Feb.	191.3	85.04	37.3	2.28	198.8	101.09	41.6	2.43
Mar.	184.0	87.02	38.0	2.29	201.5	103.74	42.0	2.47
Apr.	176.0	85.88	37.5	2.29	176.0	101.57	41.8	2.43
May	172.3	87.86	38.2	2.30	174.3	101.52	42.3	2.40
June	175.8	91.10	39.1	2.33	195.9	.....	...	...
July	175.1	91.89	39.1	2.35	....	.....	...	...
Aug.	181.2	96.80	40.5	2.39	....	.....	...	...
Sept.	187.5	97.51	40.8	2.39	....	.....	...	...
Oct.	194.5	97.27	40.7	2.39	....	.....	...	...
Nov.	195.3	98.09	40.7	2.41	....	.....	...	...
Dec.	198.2	102.66	41.9	2.45	....	.....	...	...
Tires and Tubes								
Jan.	81.6	98.52	36.9	2.67	76.9	117.55	41.1	2.86
Feb.	78.5	93.02	36.1	2.65	76.2	118.98	41.6	2.86
Mar.	76.0	98.05	37.0	2.65	77.9	122.96	42.4	2.90
Apr.	72.1	95.67	36.1	2.65	66.0	123.98	42.9	2.89
May	70.4	99.48	37.4	2.66	50.5	128.77	43.8	2.94
June	71.2	103.63	38.1	2.72	....	.....	...	...
July	71.0	106.59	38.9	2.74	....	.....	...	...
Aug.	72.5	113.96	40.7	2.80	....	.....	...	...
Sept.	74.1	113.40	40.5	2.80	....	.....	...	...
Oct.	75.3	113.24	40.3	2.81	....	.....	...	...
Nov.	76.2	115.75	40.9	2.83	....	.....	...	...
Dec.	77.1	121.40	42.2	2.87	....	.....	...	...
Rubber Footwear								
Jan.	17.5	74.87	39.2	1.91	17.1	78.20	39.9	1.96
Feb.	17.0	74.68	39.1	1.91	17.1	80.59	40.7	1.98
Mar.	16.7	76.61	39.9	1.92	17.4	79.79	40.3	1.98
Apr.	16.5	75.46	39.3	1.92	12.9	73.05	39.7	1.84
May	16.3	75.85	39.3	1.93	18.4	79.98	40.6	1.97
June	16.3	11.20	40.0	1.93	....	.....	...	...
July	15.9	75.25	39.4	1.91	....	.....	...	...
Aug.	16.4	77.18	40.2	1.92	....	.....	...	...
Sept.	16.8	76.62	39.7	1.93	....	.....	...	...
Oct.	17.1	77.01	39.9	1.93	....	.....	...	...
Nov.	17.2	77.22	39.6	1.95	....	.....	...	...
Dec.	17.1	78.01	39.8	1.96	....	.....	...	...
All Other Rubber Products								
Jan.	101.8	80.94	39.1	2.07	105.1	91.27	41.3	2.21
Feb.	95.8	80.32	38.8	2.07	105.5	91.96	41.8	2.20
Mar.	91.3	79.87	38.4	2.08	106.2	93.02	41.9	2.22
Apr.	87.4	79.87	38.4	2.08	97.1	90.03	41.3	2.18
May	85.6	80.29	38.6	2.08	105.4	92.60	41.9	2.21
June	88.3	83.77	39.7	2.11	....	.....	...	...
July	88.2	82.92	39.3	2.11	....	.....	...	...
Aug.	92.3	86.24	40.3	2.14	....	.....	...	...
Sept.	96.6	89.21	41.3	2.16	....	.....	...	...
Oct.	102.1	88.78	41.1	2.16	....	.....	...	...
Nov.	101.9	88.54	40.8	2.17	....	.....	...	...
Dec.	104.0	92.60	41.9	2.21	....	.....	...	...

Source: U. S. Department of Labor.

Note: Data are based upon reports from cooperating establishments covering both full and part-time employees who work during, or received pay for, any part of the pay period ending nearest the 15th of the month. These employment series have been adjusted to first quarter 1954 benchmark levels indicated by data from government social insurance programs. Hours and earnings data pertain only to production and related workers.

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market—in Cents)

Average Monthly Price Per Pound

	1952	1953	1954	1955	1956	1957	1958	1959
Jan.	42.96	33.24	34.16	35.07	35.24	34.82	36.31	35.67
Feb.	41.64	33.76	35.00	35.04	36.26	34.82	35.83	35.69
Mar.	41.70	34.10	35.23	34.33	36.70	35.35	36.05	35.71
Apr.	41.79	33.85	35.22	34.23	36.43	35.43	36.00	36.05
May	39.98	34.30	35.34	34.80	36.65	35.40	36.27	36.24
June	41.31	34.11	35.17	34.83	36.67	35.45	36.33	36.05
July	40.37	34.20	35.37	34.61	35.43	35.49	36.51	34.67
Aug.	40.42	33.82	35.19	34.53	34.31	35.15	36.36	33.17
Sept.	39.75	33.69	35.46	33.85	34.35	34.74	36.00	....
Oct.	37.52	33.53	35.24	33.93	34.45	35.09	36.23	....
Nov.	35.59	33.60	34.80	34.87	34.56	36.06	36.24	....
Dec.	33.76	33.52	35.03	34.95	34.56	36.50	35.75	....
Average for Year	39.71	33.81	35.10	34.59	35.50	35.36	36.16	....

Note: The Government established a ceiling of 45.76c for spot cotton on March 3, 1951. (a) Trading suspended during February.

Production Index for the Rubber Industry

(1947-1949 = 100)

(Based on man-hours)

	1957	1958	1959		1957	1958	1959
Jan.	145	116	142	July	136	125	...
Feb.	141	114	150	Aug.	141	131	...
Mar.	145	116	156	Sept.	138	136	...
Apr.	132	112	135	Oct.	135	133	...
May	134	113	134	Nov.	131	141	...
June	135	125	160	Dec.	117	140	...

Sales by the Rubber Industry

(in Millions of Dollars*)

	1957	1958	1959		1957	1958	1959
Jan.	496	448	508	July	514	478	...
Feb.	495	413	490	Aug.	514	438	...
Mar.	476	396	506	Sept.	481	464	...
Apr.	490	429	543	Oct.	490	493	...
May	481	428	524	Nov.	431	472	...
June	458	445	536	Dec.	427	518	...

Rubber Manufacturers' Inventories

(in Millions of Dollars*)

	1957	1958	1959		1957	1958	1959
Jan.	1,047	1,100	998	July	1,045	980	...
Feb.	1,036	1,087	1,022	Aug.	1,074	1,024	...
Mar.	1,030	1,069	1,030	Sept.	1,074	1,024	...
Apr.	1,031	1,047	1,015	Oct.	1,097	1,022	...
May	1,024	1,020	995	Nov.	1,101	1,018	...
June	1,027	986	992	Dec.	1,092	994	...

Source: U. S. Department of Commerce.
Notes: * Adjusted for seasonal variation.

No. 1 R.S.S.—Annual Average Prices

(New York Market—Cents per Pound)

Year	High	Low	Avg.	Year	High	Low	Avg.
1917	90	52	72.23	1938	17⅞	10¼	14.64
1918	70	40	60.15	1939	24	14⅛	17.57
1919	57	38½	48.70	1940	24	18¼	20.10
1920	56½	16	36.30	1941	24⅞	19⅛	22.40
1921	21¾	11½	16.36	1942	22½	22½	22.50
1922	28⅛	13⅝	17.50	1943	22½	22½	22.50
1923	37⅛	24¾	29.45	1944	22½	22½	22.50
1924	40⅛	17⅜	26.20	1945	22½	22½	22.50
1925	121	34⅜	72.46	1946	22½	22½	22.50
1926	88½	36¾	48.50	1947	25	14	20.00
1927	41¾	33	37.72	1948	25	18	21.99
1928	41¼	17	22.48	1949	19¾	15⅞	17.57
1929	26⅞	15½	20.55	1950	86	18	41.10
1930	16½	7½	11.98	1951	76	52	(a)
1931	8⅝	4¼	6.17	1952*	33	26½	29.15
1932	4¼	2½	3.49	1953	31⅞	19⅞	24.21
1933	9⅞	2⅞	5.96	1954	34½	19½	23.61
1934	15⅞	8¾	12.92	1955	52	29⅜	39.16
1935	13¾	10½	12.37	1956	45	26½	34.24
1936	23	13½	16.41	1957	37⅜	26⅝	31.13
1937	26⅞	14	19.39	1958	32⅝	24⅝	28.13

Note: Price was fixed by Government on August 6, 1941, at 22½c a pound for non-war uses. Free trading was resumed May 1, 1947. (a) Free trading suspended March 31, 1951. GSA selling price ranged between 52 and 66c during balance of year. * Free trading was resumed on July 1, 1952; figures represent only July through December, 1952.

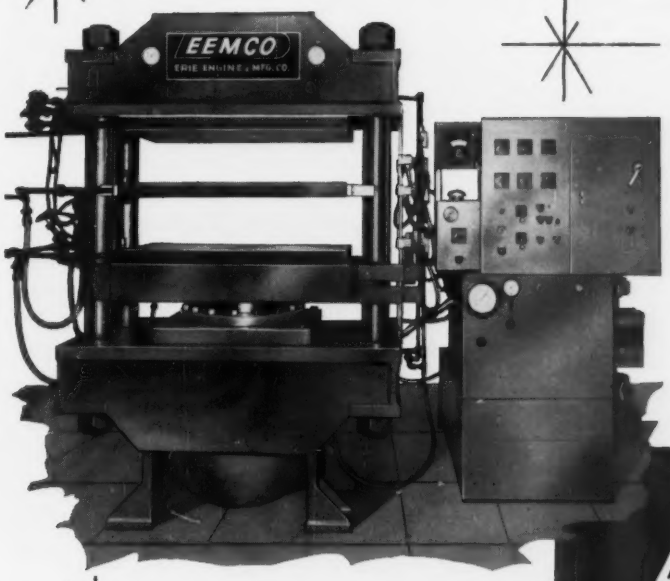
No. 1 R.S.S.—Monthly Average Prices

(New York Market—Cents per pound)

	1952	1953	1954	1955	1956	1957	1958	1959
Jan.	....	29.40	20.22	33.92	41.70	33.32	27.15	30.34
Feb.	....	27.57	19.98	34.90	33.68	30.43	26.32	30.26
Mar.	....	26.59	20.16	31.08	33.68	31.76	26.65	31.62
Apr.	....	24.66	22.06	31.75	31.74	32.23	26.44	33.72
May	....	25.52	21.96	31.35	29.61	32.12	25.51	36.48
June	....	24.42	23.01	34.74	30.54	32.80	26.20	34.31
July	30.52	23.64	24.12	40.84	33.91	32.88	27.70	35.19
Aug.	29.36	23.36	23.26	45.85	35.69	32.13	28.72	38.43
Sept.	27.42	23.06	23.99	48.27	32.64	29.94	29.49	....
Oct.	27.26	20.82	26.57	43.81	32.68	29.24	31.06	....
Nov.	29.25	20.58	28.07	44.95	35.18	27.47	32.10	....
Dec.	31.26	20.92	29.88	48.40	37.01	29.25	30.28	....
Average for Year	29.15	24.21	23.61	39.16	34.24	31.13	28.13	....

Note: (a) Free trading suspended March 31, 1951, and resumed on July 1, 1952.

HYDRAULIC PRESSES for Rubber and Plastics



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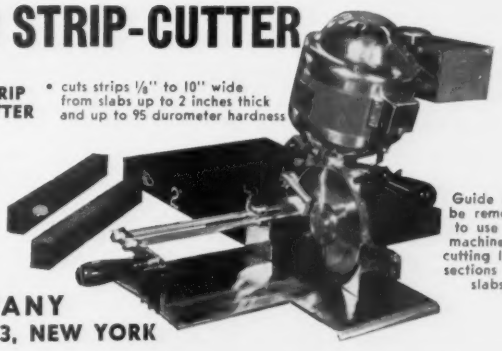

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EASTMAN MACHINE COMPANY

CLeveland 5768 **BUFFALO 3, NEW YORK**

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MORGAN AND NORMAN AVENUES, BROOKLYN 22, N. Y.

Various Compounding Materials Consumed by the Rubber Industry

Material	1951	1952	1953	1954	1955	1956	1957
Antimony, Primary							
Short tons	19e	66e	20e	15e	78	156	284
% of total	.001	.004	.001	.004	.006	.010	.024
Asphalt: [a]							
Short tons	21,414	33,288	.....	.....	.. ..	.....	.....
% of total	0.3	0.4	.....	.....	.....	.....	.....
Barite (Barytes):							
Short tons	15,000	18,000	21,000	20,000	25,104	22,101	21,782
% of total	2.13	2.0	2.0	2.0	2.0	2.0	1.0
Carbon Black:							
Short tons	530,614	537,273	566,797	511,813	643,430	622,325	635,781
% of total	93.9	93.1	94.4	93.5	93.5	95.5	95.5
Clay, Kaolin:							
Short tons	231,331	240,982	241,052	247,431	257,223	268,157	301,185
% of total	12.7	13.2	12.8	13.2	11.9	12.0	14.0
Clay, Fire & Stoneware:							
Short tons	.....	9,322	18,475	8,781	2,928	.. ..	.....
% of total	.....	0.1	.2	.1	.2	....	.....
Lime:							
Short tons	1,126	2,000	1,631	1,555	1,465	2,487	2,799
% of total	(d)	(d)	(d)	(d)	(d)	(d)	(d)
Litharge:							
Short tons	2,641	2,109	2,230	1,768	1,947	2,266	1,898
% of total	1.1	1.5	1.4	1.3	1.3	1.7	1.7
Lithopone:							
Short tons	3,295	1,523	1,723	1,701	2,163	2,000e	....
% of total	3.2	2.5	3.3	3.9	5.0	5.0	....
Mica, Ground:							
Short tons	6,551	5,126	5,668	5,021	7,339	7,021	8,579
% of total	9.0	7.9	7.8	6.3	6.9	8.0	9.0
Sulfur:							
Short tons	84,000	84,000	89,600	84,000	89,600	89,600	89,600e
% of total	1.4	1.4	1.4	1.3	1.2	1.1	1.1
Talc: [b]							
Short tons	70,970	64,476	61,408	58,139	38,309	30,253	28,532
% of total	11.2	10.9	10.0	9.7	5.4	5.0	6.0
Zinc Oxide:							
Short tons	71,507	72,774	78,439	71,058	86,677	80,459	81,745
% of total	48.4	51.2	52.7	50.7	51.5	51.9	54.0

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible. (e) Estimated.

Reclaimed Rubber

(Including Natural and Synthetic)

(All Quantities in Long Tons)

Year	New Supply	Consumption — Tons	Consumption — % to Crude [a]	Exports	Stocks On Hand at End of Period
1941	274,202	251,231	32.2	13,851	41,750
1942	**286,007** [b]	**254,820**	**64.6**	**30,402**	**42,534**
1943	**304,058** [c]	**291,082**	**59.6**	**15,678**	**46,201**
1944	**260,631** [d]	**251,083**	**35.3**	**11,800**	**43,832**
1945	**243,309**	**241,036**	**30.2**	**13,413**	**28,155**
1946	**295,612**	**275,410**	**26.5**	**14,461**	**33,666**
1947	**291,395**	**288,395**	**24.8**	**14,536**	**35,943**
1948	**266,861**	**261,113**	**24.4**	**11,428**	**32,630**
1949	**224,029**	**226,679**	**24.5**	**10,637**	**28,263**
1950	**314,008**	**303,733**	**24.1**	**11,740**	**35,708**
1951	**366,700**	**346,121**	**26.6**	**14,722**	**45,082**
1952	**274,981**	**280,002**	**22.2**	**11,180**	**30,664**
1953	**298,336**	**295,050**	**21.3**	**11,597**	**32,319**
1954	**258,101**	**249,049**	**20.2**	**10,232**	**30,746**
1955	**326,649**	**312,781**	**20.4**	**13,988**	**31,498**
1956	**287,220**	**270,547**	**18.8**	**13,832**	**34,969**
1957	**271,647**	**267,352**	**18.2**	**13,021**	**29,323**
1958	259,809	248,156	18.2	11,362	29,063
1958:					
Apr.	**20,735**	**19,746**	**19.1**	**832**	**29,440**
May	**19,601**	**20,104**	**19.6**	**1,012**	**27,862**
June	**21,230**	**20,652**	**19.2**	**1,024**	**27,763**
July	18,136	18,350	18.2	1,087	26,442
Aug.	22,432	19,347	17.4	900	27,961
Sept.	22,641	21,771	17.7	1,005	26,676
Oct.	26,554	23,563	17.2	1,028	27,340
Nov.	22,450	21,271	17.4	1,051	27,680
Dec.	24,830	23,285	17.5	841	29,063
1959:					
Jan.	25,790	25,002	17.9	1,157	27,157
Feb.	25,290	24,471	18.2	1,041	27,504
Mar.	29,327	27,869	18.8	1,375	27,582
Apr.	21,672	22,380	18.5	1,225	25,131
May	19,401	20,496	18.1	980	23,554

Source: U. S. Bureau of Mines.
Notes: (a) Solid and semi-solid products of less than 200 penetration. (b) Includes prophyllite and ground soapstone. (c) Does not include precipitated antimony sulfide as in previous years. (d) Negligible. (e) Estimated.

Cotton, Rayon and Nylon Tire Fabrics

(In Thousands of Pounds)

	Production — Rayon Tire Cord Net Woven	Rayon Tire Cord Woven	Cotton and Nylon Cord & Fabric [a]	Chafer Fabrics (all fibers)	Total Tire Cord and Fabric	Stocks [b] — Cotton and Nylon Cord & Fabric	Rayon Cord and Fabric
1958:							
Jan.-Mar.	8,372	56,522	25,647	7,367	92,924	11,255	33,913
Apr.-June	.....	.....	30,745	6,020	80,533	11,274	26,327
July-Sept.	.....	.....	31,371	6,467	91,984	11,229	26,428
Oct.-Dec.	.....	.....	34,858	8,466	107,532	12,251	25,936
Total	8,372	56,522	122,621	28,320	372,973	46,009	112,604
1959:							
Jan.-Mar.	77,307	77,307	41,565	9,163	122,661	14,025	22,093
Apr.-June	76,265	76,265	37,102	7,699	116,965	16,811	31,094
July-Sept.	.....	.....	.....	.....	.....	.....	.....
Oct.-Dec.	.....	.....	.....	.....	.....	.....	.....
Total	.....	.....	.....	.....	.....	.....	.....

Source: Bureau of the Census, U. S. Department of Commerce.
Notes: (a) Combined to avoid disclosing figures for individual companies. (b) At end of period.

Gasoline Consumption

(In Thousands of Barrels of 42 Gallons)

	1953	1954	1955	1956	1957	1958	1959
Jan.	89,634	89,634	96,397	100,642	109,295	107,281	114,720
Feb.	86,458	86,206	88,464	98,088	96,694	95,516	99,759
Mar.	98,158	101,549	105,684	112,412	113,166	108,914	118,995
Apr.	102,044	103,866	111,116	113,034	115,820	118,477	124,917
May	105,918	104,418	115,707	123,560	124,325	125,137	127,979
June	114,703	113,037	120,710	126,833	121,598	125,444	.....
July	112,969	112,231	115,653	120,708	130,251	130,903	.....
Aug.	109,124	110,223	121,816	125,847	128,808	129,925	.....
Sept.	106,158	104,706	113,379	111,574	113,567	120,389	.....
Oct.	106,037	105,607	112,558	119,204	119,334	125,097	.....
Nov.	99,210	102,393	109,212	112,113	107,705	110,587	.....
Dec.	100,225	104,258	111,034	108,096	112,691	120,305	.....
Total	1,230,629	1,238,346	1,321,730	1,372,116	1,393,254	1,417,975	

Source: U. S. Bureau of Mines.

U. S. Gross Imports of Balata, Jelutong, Gutta-Percha, etc.

(All Quantities in Long Tons)

Year	Balata — Tons	Balata — Value	Jelutong — Tons	Jelutong — Value	Gutta-Percha & Other Guttas — Tons	Gutta-Percha & Other Guttas — Value
1945	1,361	907,253	....	.....	36	21,970
1946	2,281	2,233,065	304	256,169	423	458,064
1947	1,982	2,276,531	2,878	1,496,887	392	779,591
1948	1,195	805,078	3,401	2,377,765	423	542,788
1949	1,391	814,554	1,043	834,978	197	189,021
1950	2,117	1,589,885	1,789	1,515,162	541	745,418
1951	2,452	1,973,271	1,669	2,608,359	383	430,539
1952	988	762,994	1,636	2,094,983	282	385,890
1953	1,619	866,248	1,027	1,166,837	235	303,116
1954	**949**	**504,065**	**2,196**	**2,624,926**	**417**	**511,055**
1955	1,022	967,369	1,679	1,731,821	284	318,115
1956	1,396	1,111,165	1,851	1,909,447	290	309,615
1957	1,037	670,821	1,680	1,942,067	230	270,487
1958	745	536,820	1,501	1,698,840	157	224,499
1958:						
Nov.	107	90,763	119	150,300	...	.....
Dec.	119	103,432	192	220,972	5	6,786
1959:						
Jan.	132	132,210	175	205,421	12	16,860
Feb.	49	41,650	104	121,702	7	8,439
Mar.	97	86,358	160	223,653	27	31,735
Apr.	91	59,313	108	135,129	10	16,920
May	90	65,771	115	144,934	51	53,364

Source: U. S. Department of Commerce.

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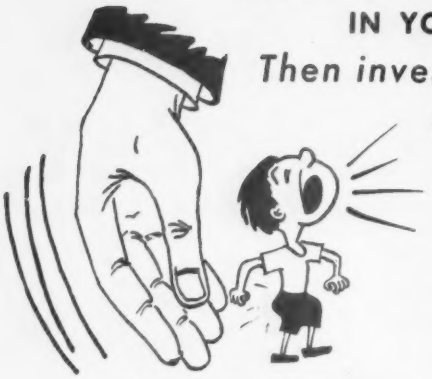

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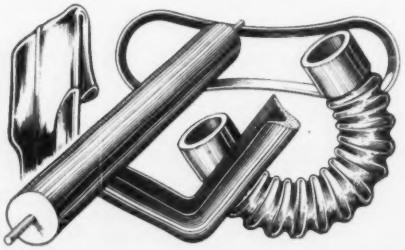

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Allied Chemical Corp.
National Aniline Div. 946
American Cyanamid Co.
Rubber Chemicals Dept. ..... Insert 1049
American Hard Rubber Co. 1065
American Synthetic Rubber Corp. 958
American Zinc Sales Co. 951
Atlas Electric Devices Co. 1042

B-B Machinery Industries, Inc. 1061
Beacon Chemical Industries, Inc. 933
Bestread Products Co. 1064
Borg-Warner Corp., Marbon Chemical Div. ... 899
Brooklyn Color Works, Inc. 1061
Brown Co. 1026, 1034, 1040
Brown Rubber Co., Inc. 1064
Burton Rubber Processing, Inc. 1065

Cabot, Godfrey L., Inc. 943
Cadillac Associates, Inc. 1064
Cambridge Instrument Co. 1040
Carter Bell Manufacturing Co. 896
Celanese Corp. of America 948
Chemical & Process Machinery Corp. 1067
CLASSIFIED ADVERTISING 1063-67
Cleveland Liner & Manufacturing Co. 906
Columbia-Southern Chemical Corp. ... Insert 904-05
Columbian Carbon Co. ..... Insert 1011-12
Concord Mica Corp. 1064
CONSULTANTS SECTION 1066
Continental Machinery Co., Inc. 1067
Copolymer Rubber & Chemical Corp. .... Insert 945
Coulter, James, Machine Co. 1053
Cowles Tool Co. 1014

D. P. R., Inc. 1036
Darlington Chemicals, Inc. 1059
Davis-Standard Div., Franklin Research Corp. .. 898
Day, J. H., Co. 922
Drake Personnel, Inc. 1064
Dow Corning Corp. 886
du Pont de Nemours, E. I. & Co., Inc.
Elastomer Chemicals Dept. ..... Second Cover

Eagle-Picher Co. 1053
Eastman Machine Co. 1061
Enjay Co., Inc. 1021
Erie Engine & Manufacturing Co. 1061
Erie Foundry Co. 932

Falls Engineering & Machine Co. 1050
Farrel-Birmingham Co., Inc. 938
Ferry Machine Co. 1053
Flexo Supply Co., Inc. 1064
Franklin Research Corp., Davis-Standard Div. .. 898

General Electric Co.
Silicones 954
General Research & Supply Co. 1068
General Tire & Rubber Co.
Chemical Div. 890-91
Genseke Brothers 1023
Goodman, G., & Son 1041
Goodrich, B. F., Chemical Co. 885
Goodrich-Gulf Chemicals, Inc.
Ameripol 1035
Black Masterbatch 931
Goodyear Tire & Rubber Co.
Chemical Div. ..... Insert 893-94; 895

Hale & Kullgren, Inc. 1066
Hall, C. P., Co. 1070
Harwick Standard Chemical Co. 949
Howe Machinery Co., Inc. 1067
Huber, J. M., Corp. 889

Industrial Ovens, Inc. 1039
Institution of the Rubber Industry 1045

Johnson Corp. 1046
Johnson Machinery Co. 1067

K. B. C. Industries, Inc. 1064

Litzler, C. A., Co., Inc. 1034

Marbon Chemical Div., Borg-Warner Corp. 899
Marine Magnesium Div. 1037
Maryland Cork Co., Inc. 1064
Mayer Refrigerating Engineers, Inc. 920
Merck & Co., Inc. 1037
Michigan Chemical Corp. 1009
Monsanto Chemical Co. 925
Motch & Merryweather Machinery Co. 950
Mt. Vernon Mills, Inc. 892
Muehlstein, H., & Co., Inc. 919

National Standard Co. 914-15
Naugatuck Chemical Division,
U. S. Rubber Co. 962
Nelson Employment Service 1064
Neville Chemical Co. 907
New England Engineering Co., Inc. 1066

Olin, R. R., Laboratories, Inc. 1066

Paterson Parchment Paper Co. 1005
Pennsalt Chemicals oCrp. 953
Pennsylvania Industrial Chemical Corp. 918
Petro-Tex Chemical Corp. 903
Phillips Chemical Co. ..... Insert 1029-32
Pike, S. J., & Co., Inc. 926
Polymer Corp. Ltd. ..... Insert 923
Pure Carbonic Co. 900

R.A.B.R.M. Books 944
Rand Rubber Co. 1066
Randall, Frank E., Co., Inc. 1036
Reliable Rubber & Plastic Machinery Co. 1066
Rhinelander Paper Co. 1044
Rhodia, Inc 1033
Ross, Charles, & Son, Co., Inc. 1043
Royce Chemical Co. 911
Royle, John & Sons 956
Rubber Age Books 942; 1044
Rubber Age Circulation 1065
Rubber Journal 1057
Rubber Red Book 1027

St. Joseph Lead Co. 936
Sargent's, C. G., Sons Corp. 1030
Schaefer Machine Co., Inc. 1046
Schulman, A., Inc. ..... Third Cover
Scott Testers, Inc. ..... Fourth Cover
Scovill Manufacturing Co. 901
Shaw, Francis & Co., Ltd. 941
Shell Chemical Corp.
Synthetic Rubber Div. 928
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Siempelkamp, G., & Co. 947
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Skinner Engine Co. 961
Snell, Foster D., Inc. 999
South Florida Test Service 1066
Southern Clays, Inc. 1041
Stamford Rubber Supply Co. 1068
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Stauffer Chemical Co., Inc. 927
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Taylor, Stiles & Co. 927
Texas-U. S. Chemical Co. ..... Insert 934-35
Thiokol Chemical Corp. 909
Turner Halsey Co. 892

United Carbon Co., Inc. 916-17
United Clay Mines Corp. 996
United Engineering & Foundry Co. 913
U. S. Rubber Co.,
Naugatuck Chemical Div. 962
Universal Oil Products Co. 921
Utility Manufacturing Co. 1044

Vanderbilt, R. T., Co., Inc. ..... Front Cover
Velsicol Chemical Corp. 1025

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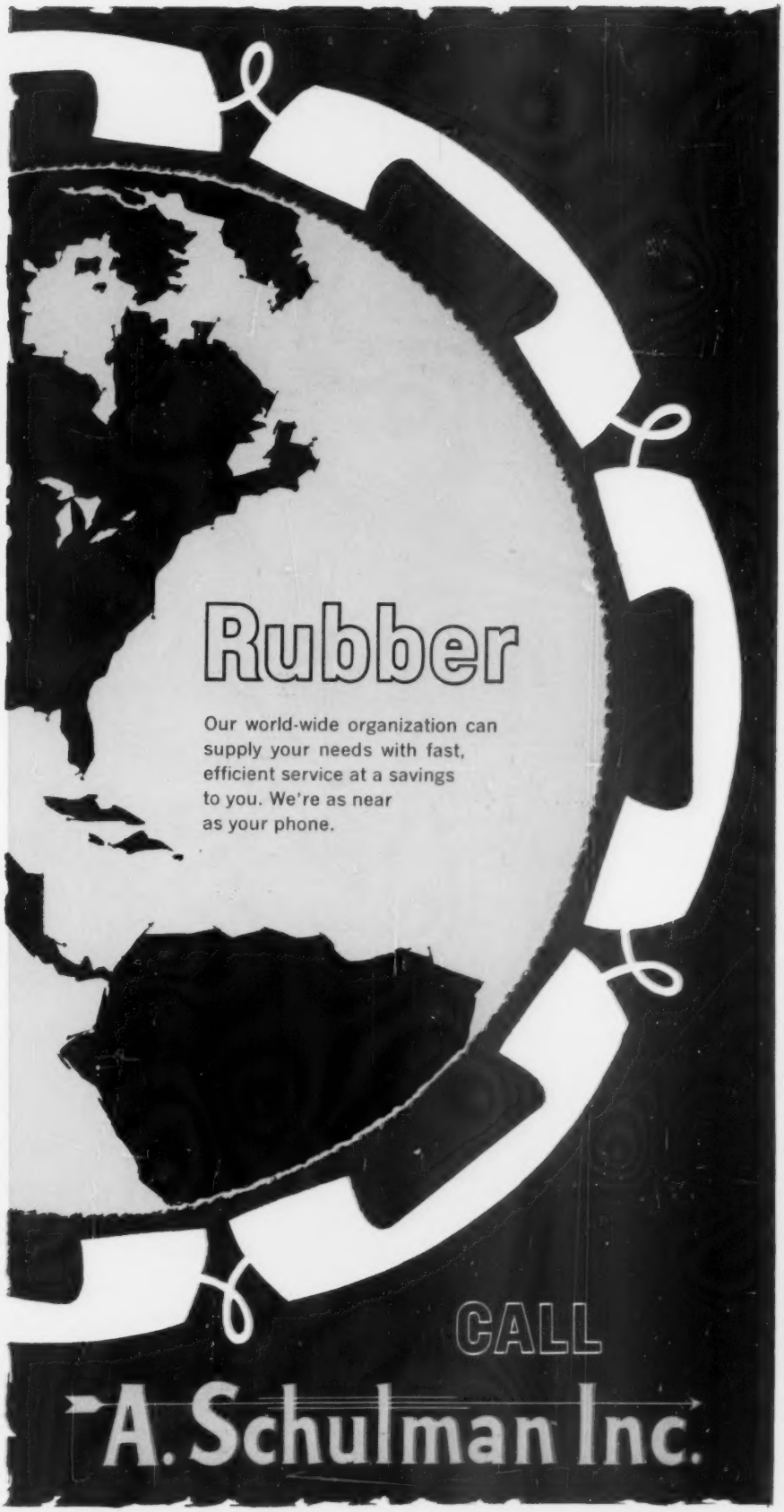
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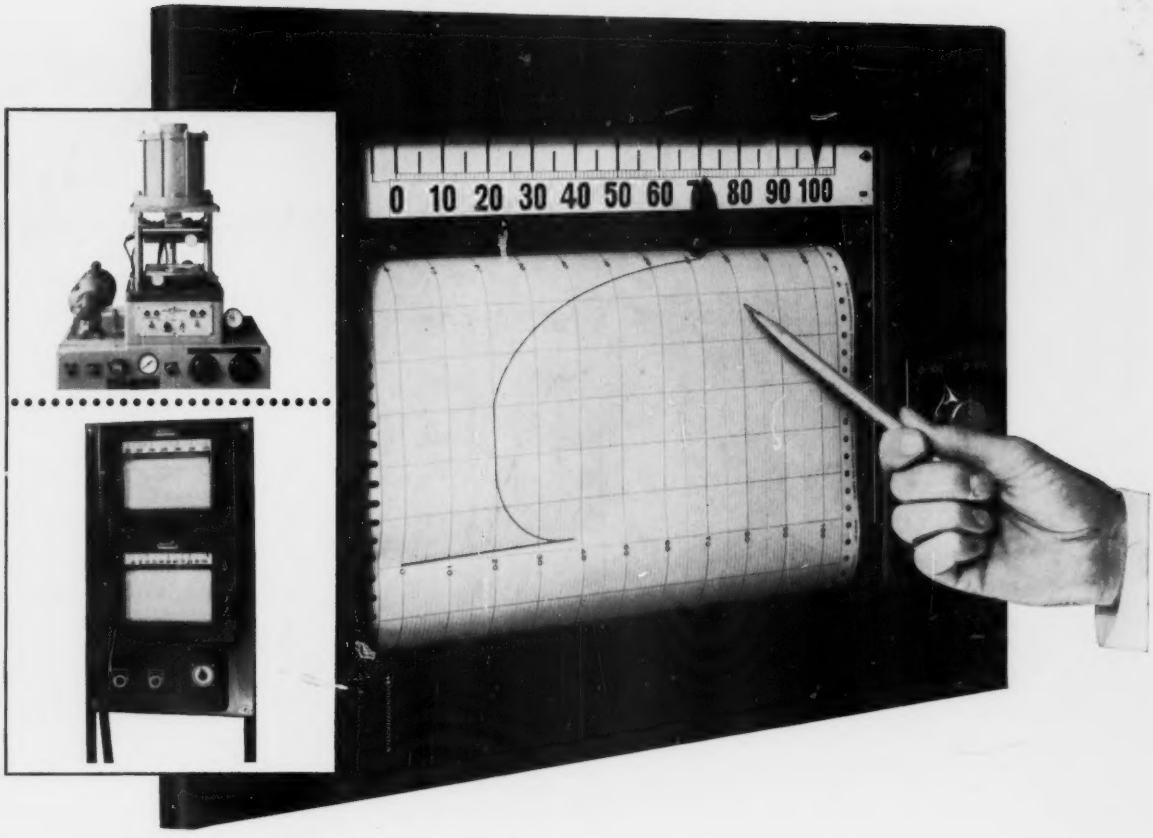

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